PROMISE®
TECHNOLOGY, INC.

SUPERTRAK
EX4650, EX4650A, EX8650, EX8650A
USER MANUAL

Version 1.0

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Recommendations

In the manual, the appearance of products made by other companies, including, but not limited to software, servers, and physical drives, is for the purpose of illustration and explanation only. Promise Technology does not recommend, endorse, prefer, or support any product made by another manufacturer.

Radio Frequency Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy, and, if not installed and used in accordance with the instruction may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult Promise Technology, Inc. or an experienced radio or TV technician for help.

This device complies with Part 5 of the FCC Rules. Operation is subject to the following conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Caution

Only digital device equipment CERTIFIED CLASS B should be attached to this equipment and that must have shielded cables.

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Chapter 1: Introduction

- About This Manual, below
- Product Overview (page 2)
- WebPAM PRO Management Software (page 3)

Thank you for purchasing one of Promise Technology's SuperTrak EX4650, EX4650A, EX8650, or EX8650A SAS/SATA RAID Controller card.

About This Manual

This *User Manual* describes how to setup, use and maintain the SuperTrak RAID controller. It also describes how to use the Web-Based Promise Array Management—Professional (WebPAM PRO) RAID management software.

This manual includes a full table of contents, chapter task lists and numerous cross-references to help you find the specific information you are looking for.

Also included are four levels of notices:

Note

A *Note* provides helpful information such as hints or alternative ways of doing a task.

Important

Important calls attention to an essential step or point required to complete a task. Important items include things often missed.

Caution

A *Caution* informs you of possible equipment damage or loss of data and how to avoid them.

Warning

A *Warning* notifies you of probable equipment damage or loss of data, or the possibility of physical injury, and how to avoid them.

Product Overview

SuperTrak EX4650, EX4650A, EX8650, and EX8650A are SAS and SATA RAID Controller cards. When used with WebPAM PRO software, the SuperTrak RAID Controllers offer a feature-rich, secure and versatile enterprise-wide ATA RAID solution. In addition, the SuperTrak EX Series supports RAID expansion. The resulting RAID environment allows users and administrators to configure, manage, and monitor everything from single logical drives on local systems to logical drive networks residing in offsite locations.

The SuperTrak EX Series RAID Controller cards support SAS hard drives as well as 1.5 Gb/s and 3.0 Gb/s SATA hard drives. At its core, both SuperTrak card provides advanced RAID management functions: creating logical drives, monitoring them, keeping them online and operating at optimum efficiency. SuperTrak can also perform many other tasks, such as:

- The SuperTrak EX4650 and EX4650A Controller cards support up to four SAS or SATA physical drives and RAID levels 0, 1, 1E, 5, 6, and 10. With a SAS expander you can attach more drives, for RAID 50 and 60.
- The SuperTrak EX8650 and EX8650A Controller cards support up to eight SAS or SATA physical drives and RAID levels 0, 1, 1E, 5, 6, 10, 50, and 60
- Set up a network of SuperTrak RAID servers (all running under different RAID levels) and monitor those servers from any workstation on the network
- Create a series of SuperTrak RAID networks at any number of offsite locations
- Monitor and repair SuperTrak RAID logical drives using the Internet from an offsite location—all without compromising the integrity of secure servers

XOR Microprocessor

The SuperTrak EX Series Controllers have an onboard microprocessor for XOR calculations, which off loads the parity calculation workload from the main CPU and transfers it to the controller card, boosting the performance of the entire system.

Hot-Swapping

Attached drives can be *hot swapped* when necessary.

WebPAM PRO Management Software

The Web-Based Promise Array Management—Professional (WebPAM PRO) software offers local and remote management and monitoring of all SuperTrak logical drives that exist anywhere on a network. Browser-based GUI provides email notification of all major events or alarms, memory cache management, drive event logging, logical drive maintenance, rebuild, and access to all components in the RAID configuration (controller, physical drives, disk arrays, logical drives, physical drives, and enclosure).

For information on using WebPAM PRO, see “Chapter 5: Management with WebPAM PRO” on page 83.

Operating System Support

On the Host PC where you install the SuperTrak controller and WebPAM PRO, Promise Technology recommends:

- Windows Vista (32 or 64 bit)
- Windows Server 2003 SP1 or SP2 (32 or 64 bit)
- Windows XP Professional SP2 (32 or 64 bit)
- Windows 2000 SP4 (32 bit)
- Red Hat Enterprise Linux 4.4, 4.5, 5.0, 5.1
- SuSE 10.1, 10.2; SLES 10, 10 SP1
- Miracle Linux 4 SP2
- Fedora Core 6, 7
- Asianux 3

On monitored systems, SuperTrak controller also supports:

- FreeBSD 6.1, 6.2
- VMware ESX 3.0.1, 3.0.2

  These Operating Systems support SuperTrak but not WebPAM PRO. You must install WebPAM PRO on a different PC and monitor the SuperTrak over a network.

Browser Support

On the Host PC where you install the SuperTrak controller and WebPAM PRO, you must have one of the following browsers:

- Internet Explorer
- Firefox
- Netscape Navigator

If you do not have one of the above browsers, install the browser first and make it the default browser. Then install WebPAM PRO.

Key Features and Benefits

The following information offers an overview of the major features of the Promise SuperTrak EX4650, EX4650A, EX8650, and EX8650A.

Advanced Hardware Design	
Features	**Benefits**
Supports multi-lane PCIe bus motherboards	Allows maximum data transfers of up to 2.5 Gb/s in both directions simultaneously to dramatically reduce the time to save and retrieve large files.
EX4650 and EX4650A support: RAID 0, 1, 1E, 5, 6, and 10. RAID 50 and 60 with SAS Expander.	Provides dramatic increase in drive performance and/or fault tolerant options. Offers performance customization and data rebuilds from the BIOS menu.
EX8650 and EX8650A support: RAID 0, 1, 1E, 5, 6, 10, 50, and 60	
Supports Serial ATA Specification II	Burst data transfer rates up to 300 MB/s from Serial ATA drives to boost overall system performance.
Supports Serial Attached SCSI Specification	Burst data transfer rates up to 300 MB/s from SAS drives to boost overall system performance.
Independent data channels for SATA and SAS drives	Drives can multiply their data transfer performance when striped together and each drive uses a separate data channel.
Supports multiple logical drives on the same physical drives	Up to 16 arrays per controller, Up to 32 logical drives per array, Up to 128 physical drives per array Up to 256 logical drives per controller.
Supports online logical drive expansion	Add disk drives to the array without affecting data availability.
Supports online logical drive migration	Change RAID level without affecting data availability.
Utilizes SuperBuild™ automenu from the SuperTrak onboard BIOS	Has “Auto Setup” option for quick and easy logical drive builds.

Advanced Hardware Design	
Features	**Benefits**
Displays status and error checking messages during bootup	Notifies user of possible errors and allows for recovery of mirrored drive logical drives directly from SuperBuild™.
Supports S.M.A.R.T. monitoring and reporting	Polls status at set intervals, reports through WebPAM PRO.
Employs the latest Promise PCI Express SATA/SAS ASIC technology	Fully supports Serial ATA specifications with 150 and 300 MB/sec timing and CRC error-checking at high speeds.
Mirror supports automatic background rebuilds	Fault tolerance can be restored automatically without rebooting.
DOS based flash upgrade of BIOS and Firmware	Verifies proper file, option to backup existing file. Download files from Promise website.
Capacity coercion	Supports four schemes of capacity coercion.
System reboot not required after create, delete, migrate or expand logical drive	System boot process continues without restarting.

Compatibility	
Features	**Benefits**
Complies with PCI v2.3 Local Bus standard	Provides highest level of hardware compatibility.
Complies with PCI Express Specification 1.0a	Provides highest level of hardware compatibility
Complies with SATA Specification 1.0a	Provides full compatibility with first generation SATA hard drives.
Complies with SATA II: Extensions to SATA 1.0a Specification	Provides enclosure and drive monitoring compatibility.
Complies with SAS Specification 1.1	Provides full compatibility with SAS hard drives.
Compliant with PCI Bus Master standard. PCI Bus Master support	Provides 32-bit I/O and, Bus Master, and Serial ATA performance for optimal system performance.

Compatibility	
Features	**Benefits**
Tested compatibility to coexist with motherboards that have integrated IDE controllers	Improves system performance and minimizes system conflicts for new and existing installations.
Compatible with all major SATA generation 1 and SATA generation 2, phase 1 and phase 2 disk drives	Promise performs verification testing with major drive manufacturers and development partners.
Features LBA support	Supports drives greater than 137 GB capacity.
Supports BIOS Boot Specification	All logical drives attached to the SuperTrak card appear in the BBS-compliant motherboards BIOS boot list.

Specifications

- Low-profile printed circuit board
- PCI-Express x8 Slot
- Controller card dimensions (HWD):
  2.69 x 6.63 x 0.75 inches (68.3 x 168.3 x 19.0 mm)
- Operating temperatures: 32° to 122°F (0°C to 50°C)
- Operating humidity: 5% to 95% non-condensing

Chapter 2: Installation

- Unpacking the SuperTrak, below
- Installing the SuperTrak Card (page 8)
- Choosing the Physical Drives (page 14)
- Creating a Logical Drive (page 15)
- Installing WebPAM PRO (page 20)
  - Windows (page 22)
  - Linux (page 29)
- Logging into WebPAM PRO (page 37)
- Setting up WebPAM PRO (page 39)

Unpacking the SuperTrak

When you receive the SuperTrak EX Series SAS/SATA RAID Controller card, the package should contain the items listed below:

- SuperTrak EX4650, EX4650A, EX8650, or EX8650A Controller card
- *Quick Start Guide*
- 0.5m (19-inch) SFF-8087 to SFF-8087 multi-lane cable
  One for EX4650 and EX4650A
  Two for EX8650 and EX8650A
- CD with WebPAM PRO software, Windows and Linux drivers, and *SuperTrak User Manual*

If any of the items are missing or appear damaged, please contact your dealer or distributor immediately.

Warning

The electronic components on the SuperTrak EX Controller cards are sensitive to damage from Electro-Static Discharge (ESD). Observe appropriate precautions at all times when handling the SuperTrak card or its subassemblies.

Warning

Before installing the SuperTrak EX Controller card into an existing system, backup any important or useful data. Failure to follow this accepted PC practice could result in data loss.

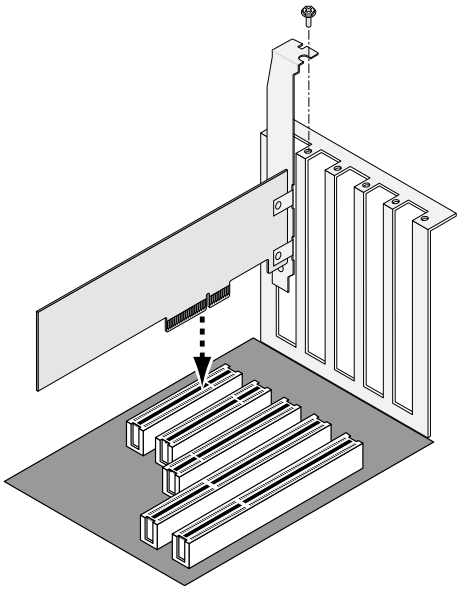
Note

The SuperTrak EX Controller cards are PCI Plug-n-Play (PnP) devices. No changes are necessary in the motherboard CMOS or BIOS Setup for resources or drive types in most applications.

Installing the SuperTrak Card

The SuperTrak EX Controller card fits into any available 3.3-volt PCI-Express x8 slot. You can also plug the SuperTrak card into a PCI-Express x16 slot.

1. Remove the cover of your system.
2. Remove the inside slot cover of an available PCI-Express slot on the motherboard.



3. Install the SuperTrak card into the open PCI-Express slot.
4. Fasten the SuperTrak card bracket to the system case.
5. Attach one end of a SAS multi-lane cable to a SAS port on the SuperTrak card.

   See Figures 1 through 4.

Figure 1. SuperTrak EX4650 card

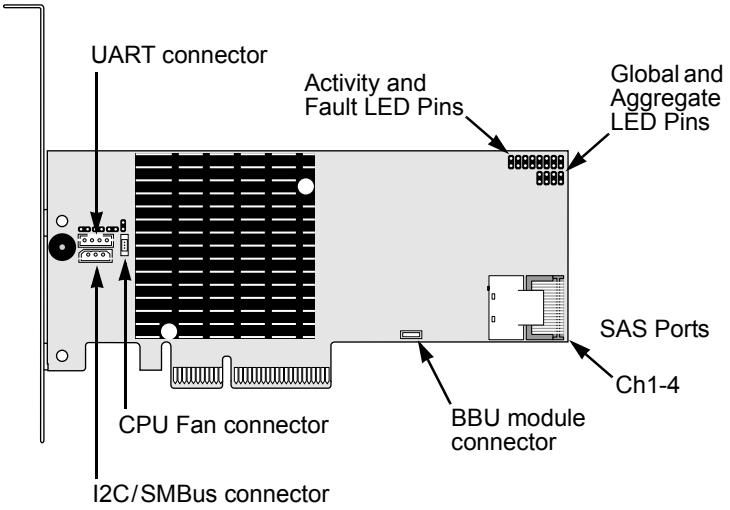


Figure 2. SuperTrak EX4650A card

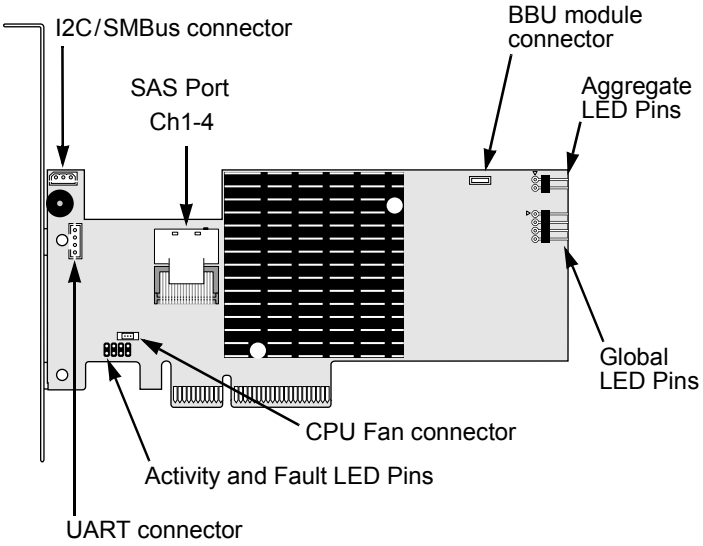


Figure 3. SuperTrak EX8650 card

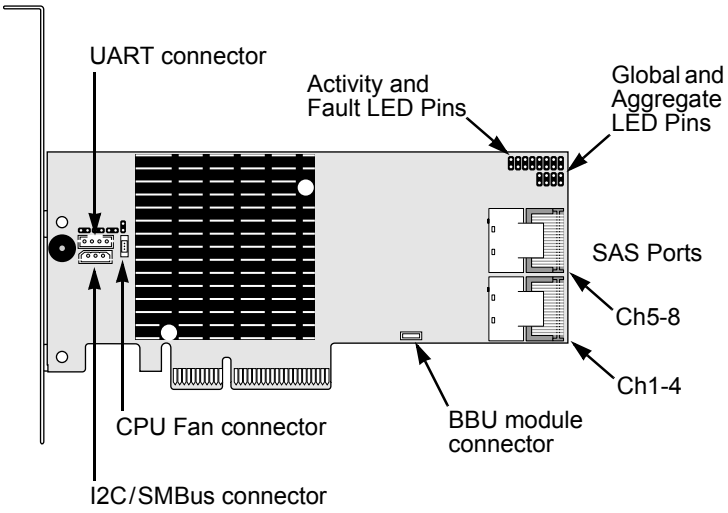
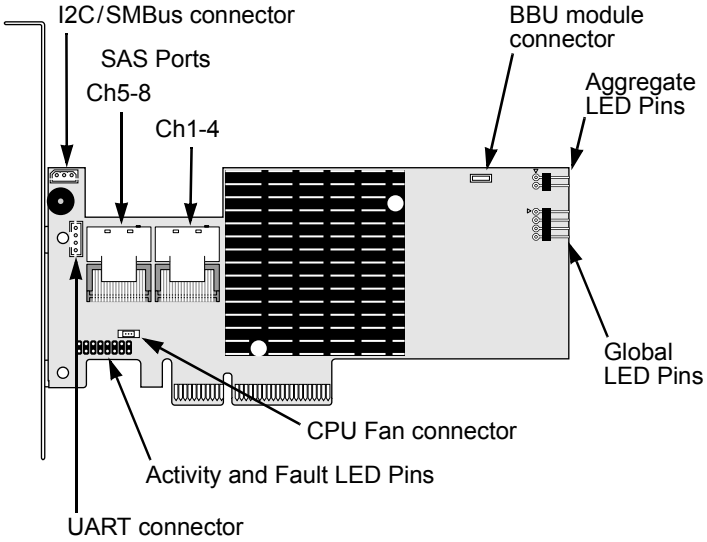


Figure 4. SuperTrak EX8650A card



6. Attach the other end of the SAS multi-lane cable to a SAS port on your enclosure's backplane or to your SAS expander.

   For more information, see the user manual for your enclosure or SAS expander.

7. Optional. Repeat steps 5 and 6 for the second SAS port on the SuperTrak EX8650 or EX8650A card.
8. Optional. Attach cables from the LED pins on the SuperTrak card to the LEDs in your PC or enclosure. See Figures 5 through 8.

   For more information, see the user manual for your PC or enclosure.

Figure 5. Individual LED pins, EX4650 and EX8650

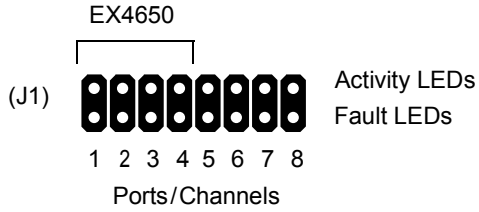


Figure 6. Individual LED pins, EX4650A and EX8650A

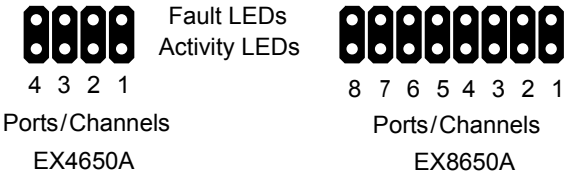


Figure 7. Global and Aggregate LED pins, EX4650 and EX8650

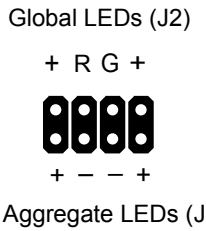
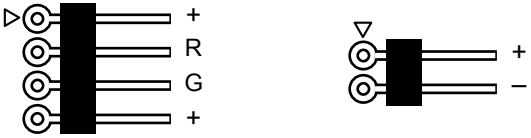


Figure 8. Global and Aggregate LED pins, EX4650A and EX8650A



Global LEDs Aggregate LEDs

SAS Connections and ID Numbers

The table below correlates the ranges of Enclosure IDs and Physical Drive IDs, that appear in the WebPAM PRO interface as a result of the data connections you make.

SuperTrak SAS Port	Enclosure ID Range	Drive ID Range
Ch1-4 Virtual*	1	1 to 128
Ch1-4	2 to 9	1 to 128
Ch5-8	10 to 17	129 to 256

* A virtual enclosure involves physical drives attached directly to the SuperTrak controller or a connection to an SGPIO backplane.

You can attach up to 128 SAS or SATA drives on each SAS port using SAS expanders.

The SuperTrak EX8650 and EX8650A cards are designed to manage up to 16 enclosures and up to 256 SAS or SATA disk drives (using SAS expanders). If your system has fewer components, you might be surprised at the way WebPAM PRO numbers your enclosures and drives. The following scenarios illustrate some numbering examples.

Scenario 1: Virtual Enclosure – SGPIO

You install the SuperTrak card into an SGPIO enclosure. You attach a SAS data cable between Port Ch1-4 and the enclosure's backplane.

In WebPAM PRO, the SGPIO enclosure appears as Enclosure 1. The drives are numbered 1 to 128.

If you attached a second SGPIO enclosure to Port Ch5-8, it would appear in WebPAM PRO as Enclosure 10. The drives would be numbered 129 to 256.

Scenario 2: Virtual Enclosure – Host PC

You install the SuperTrak card into a Host PC. You attach SAS breakout cables to Ports Ch1-4 and Ch5-8 and a SAS or SATA drive at the drive ends of each cable.

In WebPAM PRO, the Host PC appears as Enclosure 1. The drives on Port Ch1-4 are numbered 1 to 4. The drives on Port Ch5-8 are numbered 129 to 132.

This scenario also applies if you use Promise SuperSwap enclosures.

Scenario 3: External Enclosures – Daisy Chain

You install the SuperTrak card into a Host PC. You attach a SAS data cable between Port Ch1-4 and a Promise VTrak J310s 12-drive JBOD subsystem. You connect a second J310s subsystem to the first in a daisy chain.

In WebPAM PRO, the first JBOD subsystem appears as Enclosure 2. The drives are numbered 1 to 12. The second JBOD subsystem appears as Enclosure 3. The drives are numbered 13 to 24.

Scenario 4: External Enclosures – Parallel

You install the SuperTrak card into a Host PC. You attach a SAS data cable between Port Ch1-4 and a VTrak J310s subsystem. You attach a SAS data cable between Port Ch5-8 and a second J310s subsystem.

In WebPAM PRO, the first JBOD subsystem appears as Enclosure 2. The drives are numbered 1 to 12. The second JBOD subsystem appears as Enclosure 10. The drives are numbered 129 to 140.

Scenario 5: SAS Expanders

You install the SuperTrak card into a Host PC. You attach a SAS data cables between Ports Ch1-4 and Ch5-8 and two SAS Expanders.

In WebPAM PRO, the first Expander appears as Enclosure 2. The drives are numbered 1 to 128. The second Expander appears as Enclosure 10. The drives are numbered 129 to 256.

See “Viewing Enclosure Information” on page 121 and “Locating a Physical Drive” on page 122 for more information.

Choosing the Physical Drives

The SuperTrak EX Controller card supports SAS and 1.5-Gb/s or 3.0-Gb/s SATA physical drives. For optimal performance, install physical drives of the same model and capacity. The drives' matched performance allows the logical drive to function better as a single logical drive.

Level	Number of Drives	Level	Number of Drives
RAID 0	1 or more	RAID 6	4 to 16*
RAID 1	2 only	RAID 10	4 or more**
RAID 1E	3 or more	RAID 50	6 or more
RAID 5	3 to 16*	RAID 60	8 or more
* Requires SAS expansion ** Requires an even number of drives			

The table above shows the number of drives required for each RAID level.

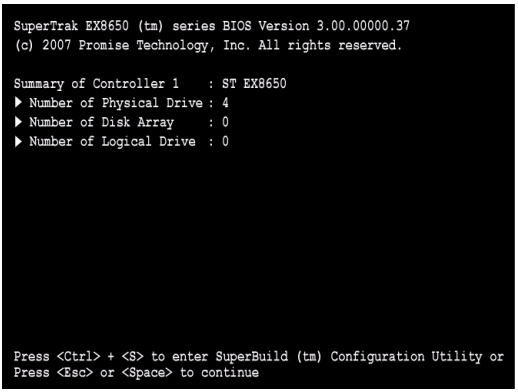
Creating a Logical Drive

You can use the SuperBuild™ Configuration Utility to create a logical drive with the attached physical drives. Even if you plan to use the WebPAM PRO software to manage your logical drives, you can still create your first logical drive using the SuperBuild Utility, as described here.

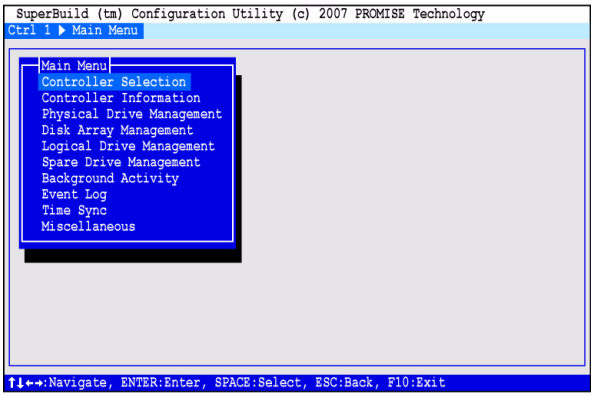
Note

For an explanation of the logical drive concepts and the choices you can make when you create your logical drive, see “Chapter 6: Technology Background” on page 155 of this manual.

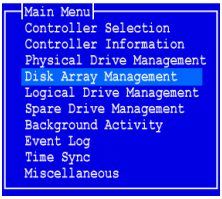
1. Boot your system. If this is the first time you have booted with the SuperTrak card and physical drives installed, the SuperTrak BIOS will display the following screen.


SuperTrak EX8650 (tm) series BIOS Version 3.00.00000.37
(c) 2007 Promise Technology, Inc. All rights reserved.
Summary of Controller 1 : ST EX8650
Number of Physical Drive : 4
Number of Disk Array : 0
Number of Logical Drive : 0
Press <Ctrl> + <S> to enter SuperBuild (tm) Configuration Utility or
Press <Esc> or <Space> to continue

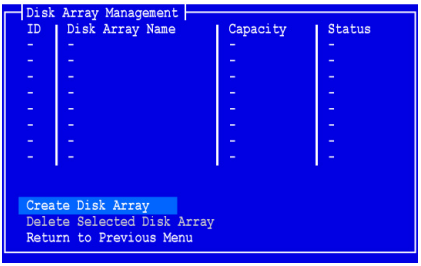
2. Press the Ctrl-S keys to display the SuperBuild Utility Main Menu.



3. Press the arrow keys to highlight *Disk Array Management* and press Enter.

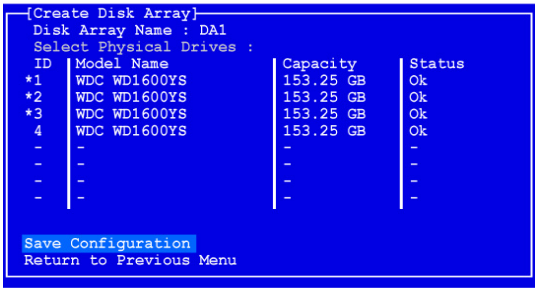


The Disk Array Management screen appears.



4. Highlight *Create Disk Array* and press Enter.

The Create Disk Array screen appears.



Use this screen to select the physical drives for your disk array.

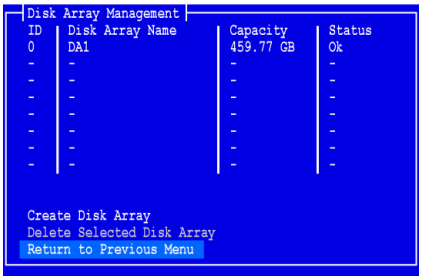
5. Press the arrow keys to highlight a physical drive. Then press the spacebar to select the physical drive.

An asterisk (*) appears at the left of each selected physical drive.

6. Highlight *Save Configuration* and press Enter.

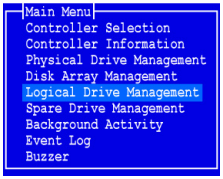
The Disk Array Management screen appears, showing your new disk array

7. Highlight *Return to Previous Menu* and press Enter.



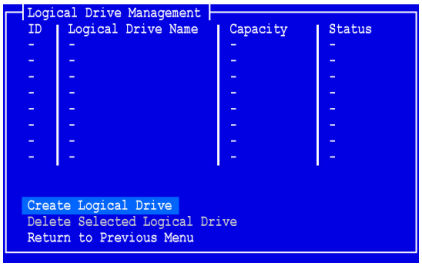
The Main Menu appears.

8. Highlight *Logical Drive Management* and press Enter.



The Logical Drive Management screen appears.

9. Highlight *Create Logical Drive* and press Enter.

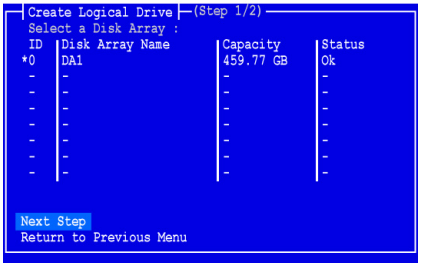


The Create Logical Drive Step 1/2 screen appears.

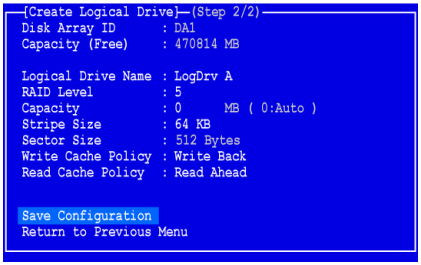
10. Press the arrow keys to highlight a disk array. Then press the spacebar to choose the disk array.

    An asterisk (*) appears at the left of the chosen disk array.

11. Highlight *Next Step* and press Enter.



The Create Logical Drive Step 2/2 screen appears.


Create Logical Drive (Step 2/2)
Disk Array ID : DA1
Capacity (Free) : 470814 MB
Logical Drive Name : LogDrv A
RAID Level : 5
Capacity : 0 MB (0:Auto)
Stripe Size : 64 KB
Sector Size : 512 Bytes
Write Cache Policy : Write Back
Read Cache Policy : Read Ahead
Save Configuration
Return to Previous Menu

12. To change the RAID Level, highlight *RAID Level* and press Enter.

    In the popup menu, highlight your choice of RAID Level and press Enter.

    The available RAID Levels depend on the number of physical drives you selected for your disk array.

13. Press the arrow keys to highlight *Logical Drive Name*. Type a name for your logical drive and press Enter.

14. To use less than the full physical drive capacity for this logical drive, highlight *Capacity* and press Enter.

    Press the Delete or Backspace keys to erase the current capacity. Type the new capacity in MB to allocate to this logical drive.

    Later, you can assign the unused capacity to a second logical drive.

15. To change the Stripe Size, highlight *Stripe Size* and press Enter.

    Highlight your choice of *64 KB*, *128 KB, 256 KB, 512 KB, or 1024 KB* and press Enter.

16. To change the Sector Size, highlight *Sector Size* and press Enter.

    Highlight your choice of *512 B, 1 KB, 2 KB,* or *4 KB* and press Enter.

17. To change the Write Cache Policy, highlight *Write Cache Policy* and press Enter.

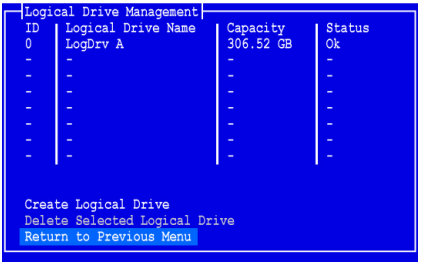
    Highlight your choice of *Write Through* or *Write Back* and press Enter.

18. To change the Read Cache Policy, highlight *Read Cache Policy* and press Enter.

    Highlight your choice of *None*, *Read Cache*, or *Read Ahead* and press Enter.

19. Highlight *Save Configuration* and press Enter.

    The Logical Drive Management screen appears with your new logical drive.



    At this point you can create additional logical drives, if there is physical drive space available. To create another logical drive, repeat steps 4 though 18 above.

20. Press the F10 key to exit the SuperBuild utility and press Y to confirm and restart the computer.

    Do not press the Ctrl-Alt-Del keys. Do not press the Esc key.

You have successfully created a new RAID logical drive.

Important

You must be partition and format your new logical drive before you can use it. Use the same method of partitioning and formatting a logical drive as you would any other fixed disk added to your computer system.

Installing WebPAM PRO

Web-Based Promise Array Management—Professional (WebPAM PRO) software provides a browser-based graphic user interface used to monitor and manage Promise RAID products and their logical drives. Because it works over your network, it can monitor and control multiple systems.

WebPAM PRO involves four components:

- **Utility Server** – Enables RAID management over a network
- **Agent** – Enables the Host PC to communicate with the Utility Server
- **Java Runtime Environment (JRE)** – A private installation for WebPAM PRO
- **Internet Browser** – Comes with your OS

When you install WebPAM PRO on a PC or server, you are installing the Utility Server, Agent, and JRE.

- Utility Server (page 20)
- Agent (page 20)
- JRE (page 21)
- Internet Browser (page 21)
- Installing WebPAM PRO onto a Windows PC or Server (page 22)
- Installing WebPAM PRO onto a Linux PC or Server (page 29)

Utility Server

The Utility Server runs on the Host PC (where the SuperTrak card is installed). You run the Utility Server by directing your browser to the IP address of the Host PC.

Agent

The Agent runs on the Host PC where the SuperTrak card is installed. After you have logged into the Utility Server through WebPAM PRO, the Utility Server accesses the Agent on the Host PC. As the user, you do not access the Agent directly.

Operating System Support

On the Host PC where you install the SuperTrak controller and WebPAM PRO, Promise Technology recommends:

- Windows Vista (32 or 64 bit)
- Windows Server 2003 SP1 or SP2 (32 or 64 bit)
- Windows XP Professional SP2 (32 or 64 bit)
- Windows 2000 SP4 (32 bit)

- Red Hat Enterprise Linux 4.4, 4.5, 5.0, 5.1
- SuSE 10.1, 10.2; SLES 10, 10 SP1
- Miracle Linux 4 SP2
- Fedora Core 6, 7
- Asianux 3

Choose one of these operating systems to take full advantage of all the features of WebPAM PRO.

JRE

The WebPAM PRO installation program installs a private Java Runtime Environment (JRE) under the same directory where WebPAM PRO is installed. WebPAM PRO uses this private JRE to avoid incompatibility issues with any other JREs that may be present on your system.

Internet Browser

Typically an Internet browser comes with your operating system. The WebPAM PRO installer does not include a browser. For computers that will remotely monitor and manage the RAID, the browser is the only software required.

Browser Support

Choose the latest version of the following browsers to use with WebPAM PRO:

- Internet Explorer
- Firefox
- Netscape Navigator

If you do not have one of the above browsers on the Host PC, install the browser first and make it the default browser. Then install WebPAM PRO.

Important

Install the SuperTrak driver for your operating system before installing WebPAM PRO. See “Chapter 3: Installing Drivers” on page 41 for instructions.

Go to one of the following procedures:

- “Installing WebPAM PRO onto a Windows PC or Server” on page 22.
- “Installing WebPAM PRO onto a Linux PC or Server” on page 29.

Installing WebPAM PRO onto a Windows PC or Server

Follow these steps to install WebPAM PRO on your Windows-based PC or Server.

1. Boot the PC or server, launch Windows, and log in as the Administrator.

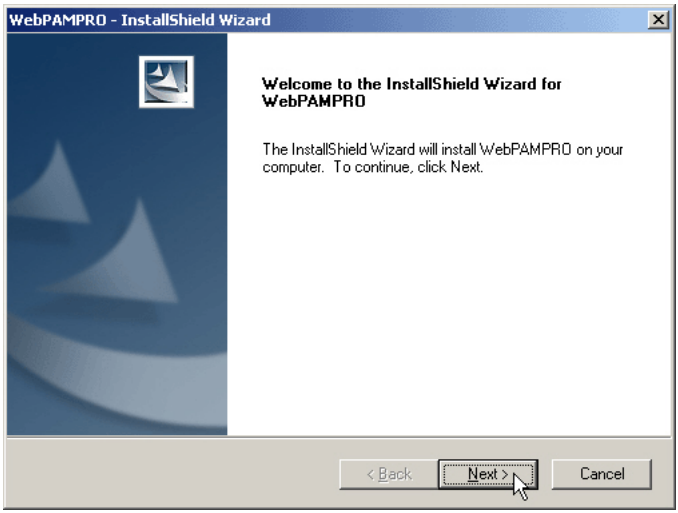
   If the computer is already running, exit all programs. If you are not logged in as the Administrator, log out, then log in again as the Administrator.

2. Insert the Software CD into your CD-ROM drive.
3. Double-click the Install CD's icon to open it.
4. Open the WebPAM PRO/Windows folder and double-click the Installer icon to launch it (right).

   The first WebPAM PRO installation dialog box appears.

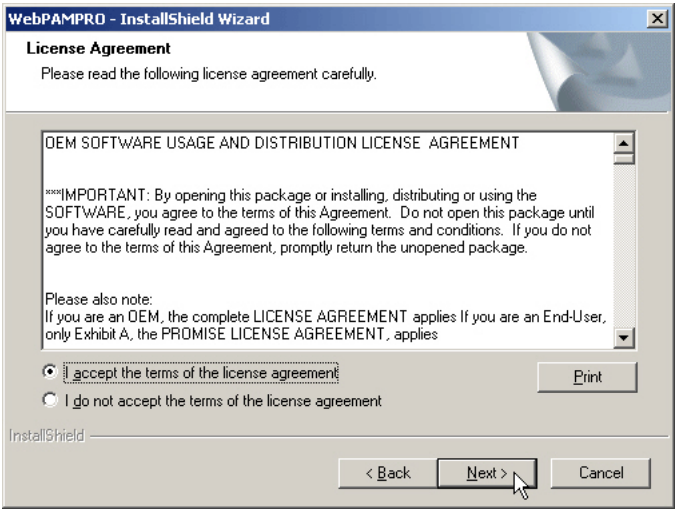
5. In the Introduction dialog box, click the **Next** button to proceed with installation.

Figure 9. Introduction dialog box


WebPAMPRO - InstallShield Wizard
Welcome to the InstallShield Wizard for WebPAMPRO
The InstallShield Wizard will install WebPAMPRO on your computer. To continue, click Next.
< Back
Next >
Cancel

6. In the License Agreement dialog box, choose the I accept... option, then click the Next button.

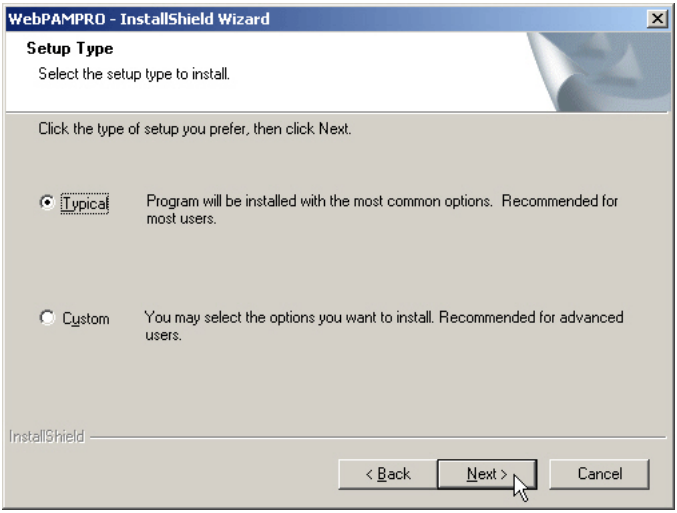
Figure 10. License Agreement dialog box


WebPAMPRO - InstallShield Wizard
License Agreement
Please read the following license agreement carefully.
OEM SOFTWARE USAGE AND DISTRIBUTION LICENSE AGREEMENT
***IMPORTANT: By opening this package or installing, distributing or using the SOFTWARE, you agree to the terms of this Agreement. Do not open this package until you have carefully read and agreed to the following terms and conditions. If you do not agree to the terms of this Agreement, promptly return the unopened package.
Please also note:
If you are an OEM, the complete LICENSE AGREEMENT applies If you are an End-User, only Exhibit A, the PROMISE LICENSE AGREEMENT, applies
I accept the terms of the license agreement
I do not accept the terms of the license agreement
Print
InstallShield
< Back
Next >
Cancel

7. In the Setup Type dialog box, choose the option you prefer:
   - **Typical** – Better for most applications
   - **Custom** – For advanced users and special applications. Additional choices follow this option

   Click the **Next** button to continue.

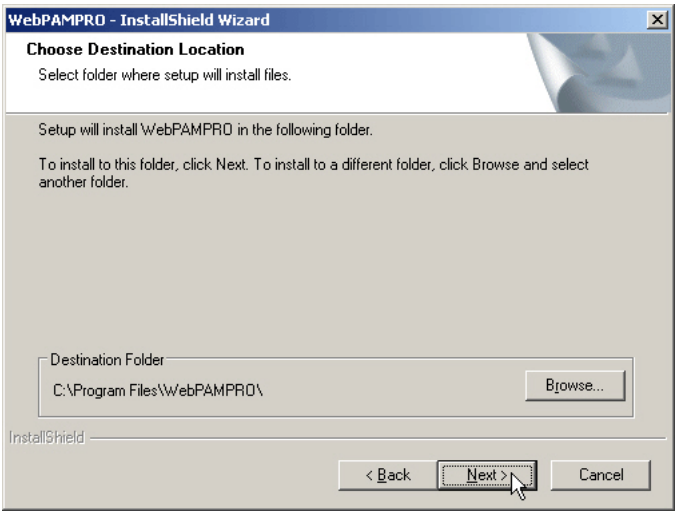
Figure 11. Setup Type dialog box


WebPAMPRO - InstallShield Wizard
Setup Type
Select the setup type to install.
Click the type of setup you prefer, then click Next.
Typical
Program will be installed with the most common options. Recommended for most users.
Custom
You may select the options you want to install. Recommended for advanced users.
InstallShield
< Back
Next >
Cancel

8. In the Choose Destination Location dialog box, you can:
   - Accept the default installation folder (recommended)
   - Specify a different installation folder (advanced users)

   When you agree with the proposed installation folder, click the **Next** button.

Figure 12. Choose Destination Location dialog box


WebPAMPRO - InstallShield Wizard
Choose Destination Location
Select folder where setup will install files.
Setup will install WebPAMPRO in the following folder.
To install to this folder, click Next. To install to a different folder, click Browse and select another folder.
Destination Folder
C:\Program Files\WebPAMPRO\
Browse...
InstallShield
< Back
Next >
Cancel

9. In the SSL Security Options dialog box, check the box to select SSL security.

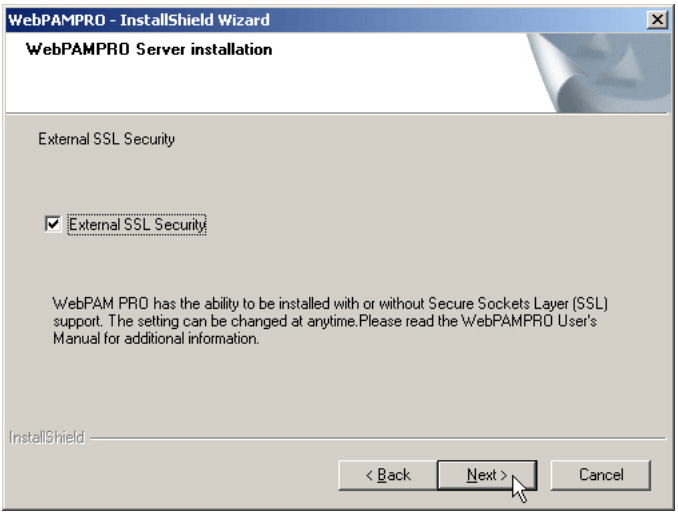
   External SSL Security – Applies security to all connections involving the Internet or outside your company firewall.

   Security options are invisible to authorized users.

   Promise Technology provides a default certificate for the server as well as for internal data communication. However, in some cases it is better to install and verify your own certificate for the webserver. And, if possible, verify the certificate by a certificate authority such as Verisign or Thwate. See your MIS Administrator for guidance.

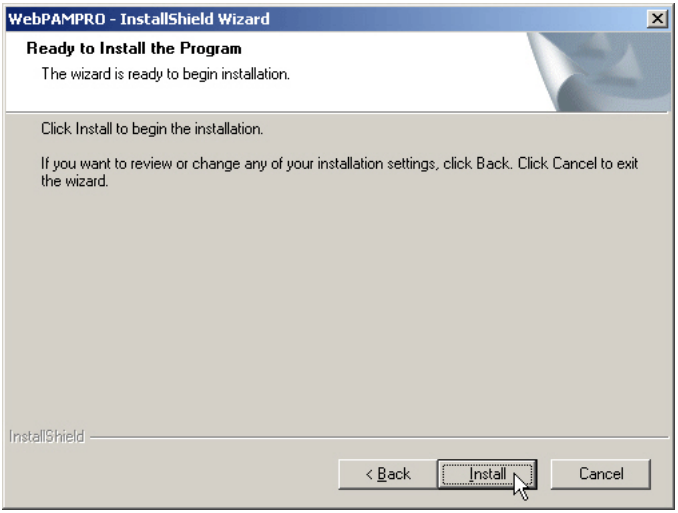
   Click the **Next** button to continue.

Figure 13. SSL Security Options dialog box


WebPAMPRO - InstallShield Wizard
WebPAMPRO Server installation
External SSL Security
External SSL Security
WebPAM PRO has the ability to be installed with or without Secure Sockets Layer (SSL) support. The setting can be changed at anytime.Please read the WebPAMPRO User's Manual for additional information.
InstallShield
< Back
Next >
Cancel

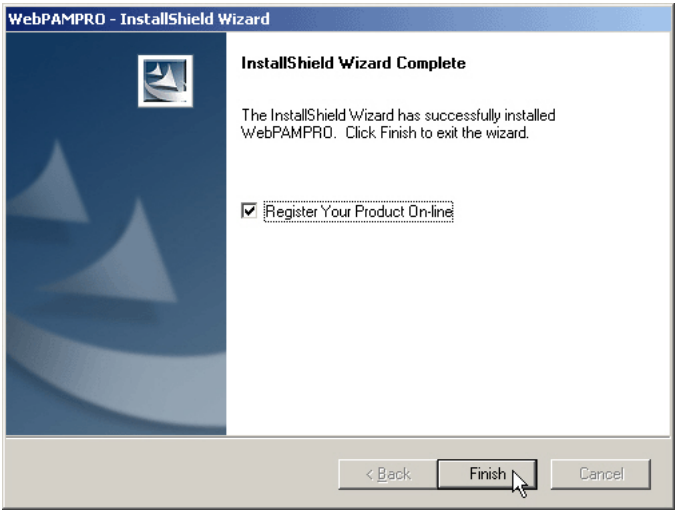
10. In the Ready to Install dialog box, click the **Install** button to continue.

Figure 14. Ready to Install dialog box


WebPAMPRO - InstallShield Wizard
Ready to Install the Program
The wizard is ready to begin installation.
Click Install to begin the installation.
If you want to review or change any of your installation settings, click Back. Click Cancel to exit the wizard.
InstallShield
< Back
Install
Cancel

11. In the Install Complete dialog box, click the **Finish** button to exit the installer.

Figure 15. Install Complete dialog box


WebPAMPRO - InstallShield Wizard
InstallShield Wizard Complete
The InstallShield Wizard has successfully installed WebPAMPRO. Click Finish to exit the wizard.
Register Your Product On-line
< Back
Finish
Cancel

With the Register Your Product Online box checked, your browser will open and go directly to the Promise product registration website. Thank you for taking the time to register.

This completes the WebPAM PRO installation for Windows. Go to “Logging into WebPAM PRO” on page 37.

Installing WebPAM PRO onto a Linux PC or Server

If you have a previous version of WebPAM PRO installed on your PC or server, remove it now, before you install the current version of WebPAM PRO.

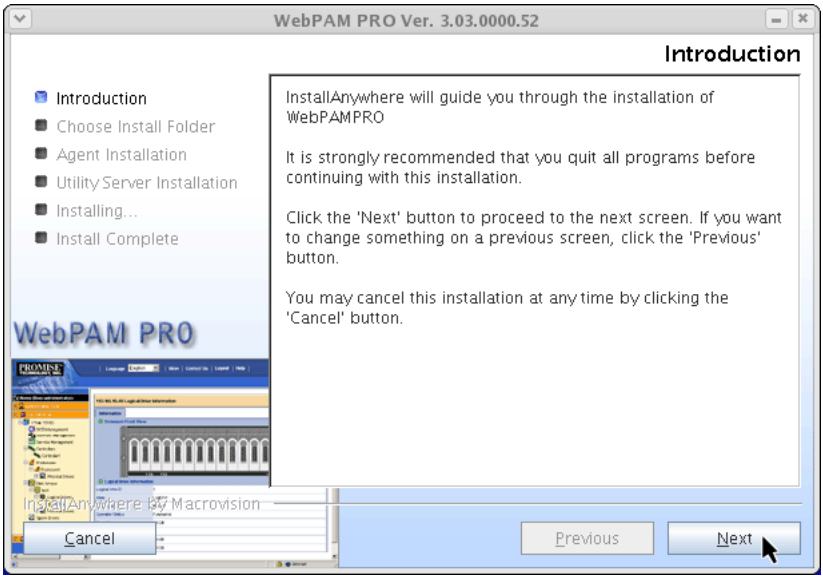
Follow these steps to install WebPAM PRO on your Linux-based PC or Server.

1. Boot the PC or server, log in as **root**, and launch the Linux GUI.

   If the computer is already running, exit all programs. If you are not logged in as **root**, log out, then log in again as **root**.
2. Insert the Software CD into your CD-ROM drive.
3. Open a Terminal window, then go to **/media/cdrom/** and search for the **WebPAMPRO...Linux.bin** file.
4. Type **sh** followed by the exact name of the **WebPAMPRO...Linux.bin** file, then press Enter.

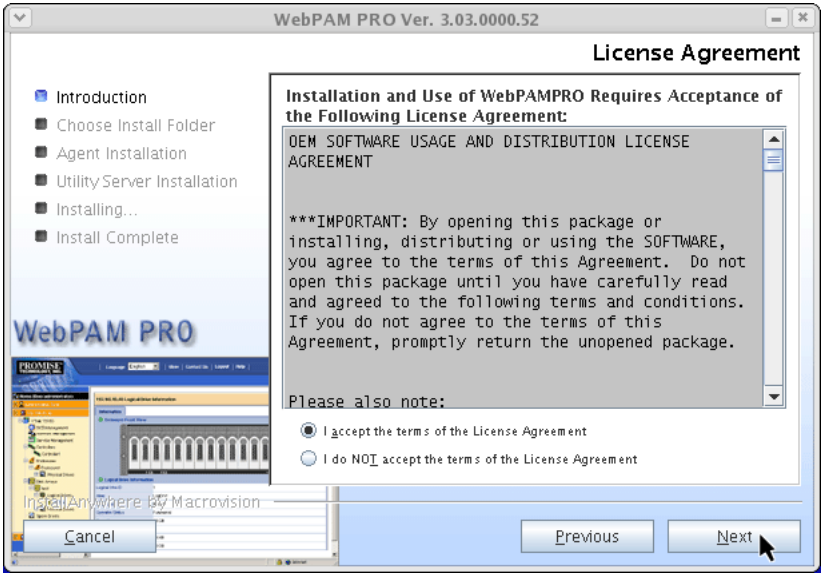
   After several moments, the first WebPAM PRO installation dialog box appears.
5. In the Introduction dialog box, click the **Next** button to proceed with installation.

Figure 16. Introduction dialog box


WebPAM PRO Ver. 3.03.0000.52
Introduction
Introduction
Choose Install Folder
Agent Installation
Utility Server Installation
Installing...
Install Complete
InstallAnywhere will guide you through the installation of WebPAMPRO
It is strongly recommended that you quit all programs before continuing with this installation.
Click the 'Next' button to proceed to the next screen. If you want to change something on a previous screen, click the 'Previous' button.
You may cancel this installation at any time by clicking the 'Cancel' button.
WebPAM PRO
InstallAnywhere by Macrovision
Cancel
Previous
Next

6. In the License Agreement dialog box, choose the **I accept...** option, then click the **Next** button.

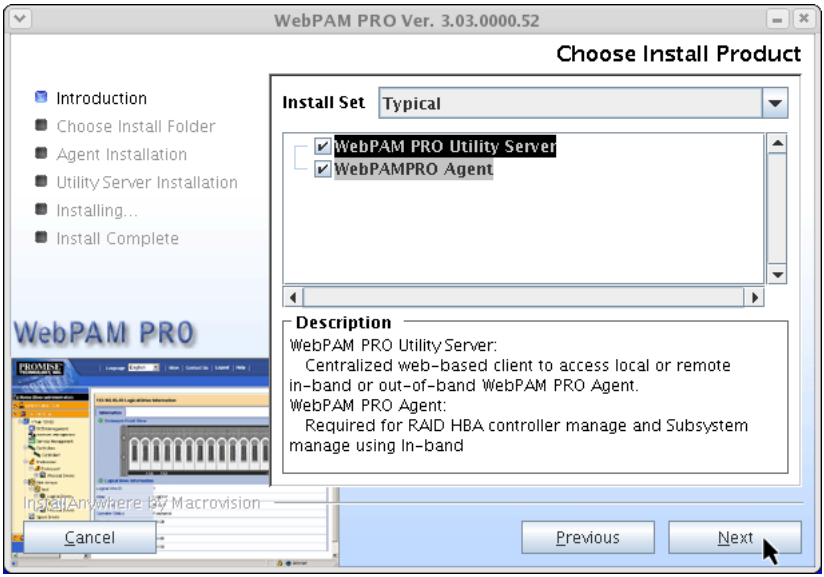
Figure 17. License Agreement dialog box


WebPAM PRO Ver. 3.03.0000.52
License Agreement
Introduction
Choose Install Folder
Agent Installation
Utility Server Installation
Installing...
Install Complete
WebPAM PRO
Installation and Use of WebPAMPRO Requires Acceptance of the Following License Agreement:
OEM SOFTWARE USAGE AND DISTRIBUTION LICENSE AGREEMENT
***IMPORTANT: By opening this package or installing, distributing or using the SOFTWARE, you agree to the terms of this Agreement. Do not open this package until you have carefully read and agreed to the following terms and conditions. If you do not agree to the terms of this Agreement, promptly return the unopened package.
Please also note:
I accept the terms of the License Agreement
I do NOT accept the terms of the License Agreement
InstallAnywhere by Macrovision
Cancel
Previous
Next

7. In the Choose Product Install dialog box, choose the option you prefer:
   - **Typical** – Better for most applications
   - **Custom** – For advanced users and special applications. Additional choices follow this option

   Click the **Next** button to continue.

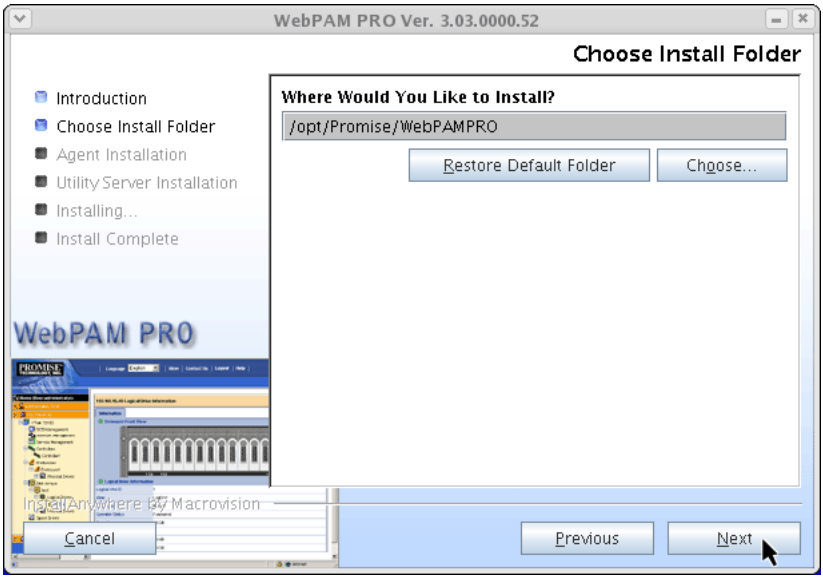
Figure 18. Choose Install Product dialog box



8. When the Choose Install Folder dialog box appears, you can:
   - Accept the default installation folder (recommended)
   - Specify a different installation folder (advanced users)

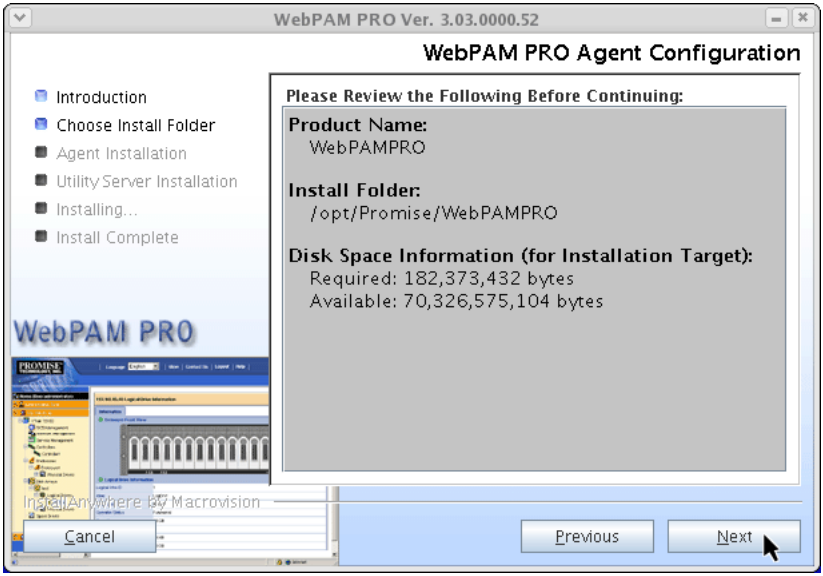
   When you agree with the proposed installation folder, click the **Next** button.

Figure 19. Choose Install Folder dialog box



9. In the WebPAM PRO Agent Configuration dialog box, click the **Next** button to continue.

Figure 20. WebPAM PRO Agent Configuration dialog box



10. In the SSL Security Options dialog box, check the box to select SSL security.

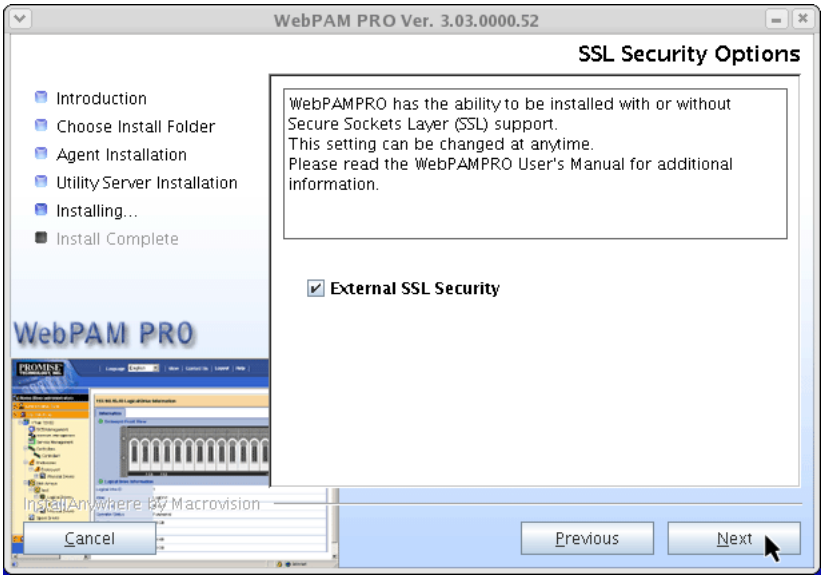
    External SSL Security – Applies security to all connections involving the Internet or outside your company firewall.

    Security options are invisible to authorized users.

    Promise Technology provides a default certificate for the server as well as for internal data communication. However, in some cases it is better to install and verify your own certificate for the webserver. And, if possible, verify the certificate by a certificate authority such as Verisign or Thwate. See your MIS Administrator for guidance.

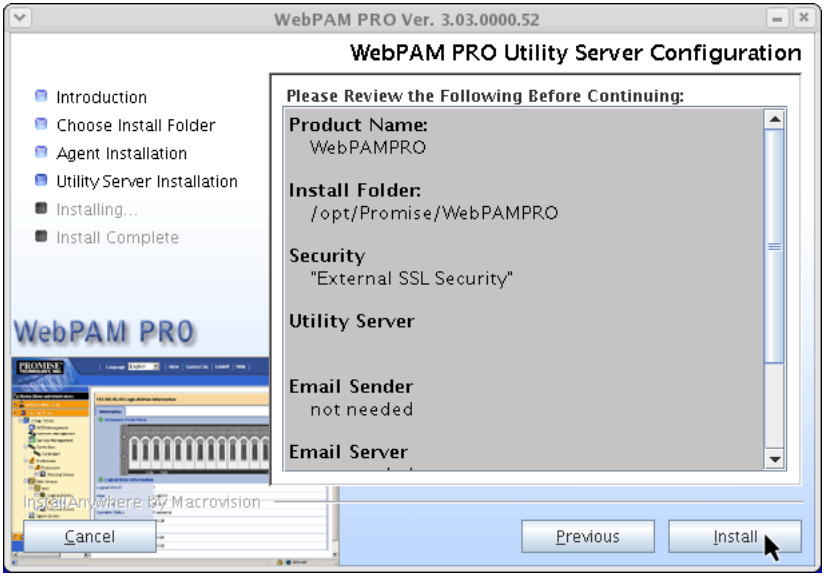
    Click the **Next** button to continue.

Figure 21. SSL Security Options dialog box



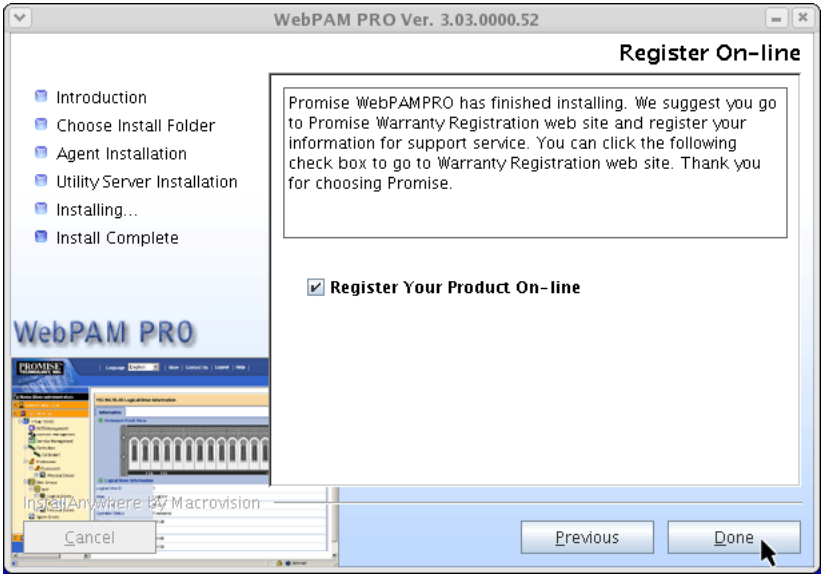
11. In the WebPAM PRO Utility Server Configuration dialog box, click the **Install** button to continue.

Figure 22. WebPAM PRO Utility Server Configuration dialog box



12. In the Register On-line dialog box, click the **Done** button to exit the installer

Figure 23. Register On-line dialog box


WebPAM PRO Ver. 3.03.0000.52
Register On-line
Introduction
Choose Install Folder
Agent Installation
Utility Server Installation
Installing...
Install Complete
Promise WebPAMPRO has finished installing. We suggest you go to Promise Warranty Registration web site and register your information for support service. You can click the following check box to go to Warranty Registration web site. Thank you for choosing Promise.
Register Your Product On-line
WebPAM PRO
InstallAnywhere by Macrovision
Cancel
Previous
Done

With the Register Your Product On-line box checked, your browser will open and go directly to the Promise product registration website. Thank you for taking the time to register.

Note

The first time you install WebPAM PRO on a RedHat Linux system, the WebPAM PRO icon appears on the desktop but not in the application menu. Please log out, then log in again, and the WebPAM PRO icon will thereafter appear in the application menu.

This completes the WebPAM PRO installation for Linux. Go to “Logging into WebPAM PRO” on page 37.

Logging into WebPAM PRO

You can log into WebPAM PRO in either of two ways:

- Logging in at the Host PC (page 37)
- Logging in over the Network (page 37)

Logging in at the Host PC

At the Host PC (where the SuperTrak EX Controller is installed), do one of the following actions:

- Double-click the WebPAM PRO desktop icon.
- Choose *WebPAM PRO* in the Windows Programs menu.
- Choose *WebPAM PRO* in the Linux Applications menu.
- Follow the steps under “Logging in over the Network”.

Logging in over the Network

You can log into WebPAM PRO from any PC with a network connection to the Host PC (where the SuperTrak EX Controller is installed).

1. Launch your Browser.
2. In the Browser address field, type the information provided below. Then press Enter.

   If you selected External SSL Security during installation (Windows, see page 26; Linux, see page 34), use the *Secure Connection*. Otherwise, use the *Regular Connection*.

Regular Connection

- WebPAM PRO uses an HTTP connection. . . . . .http://
- Enter the Host PC’s IP address 192.168.10.228
- Enter the Port number . . . . . :8080
- Add promise to launch WebPAM PRO . . . . . /promise

Together, your entry looks like this:

http://192.168.10.228:8080/promise

Secure Connection

- WebPAM PRO uses a secure HTTP connection . . . . . .https://
- Enter the Host PC’s IP address 192.168.10.228
- Enter the Port number . . . . . :8443
- Add promise to launch WebPAM PRO . . . . . /promise

Together, your entry looks like this:

https://192.168.10.228:8443/promise

Notes

- You can enter the Host PC's network name in place of the IP address.
- If you are logging in at the Host PC, you can enter **localhost** in place of the IP address.
- Whether you select a regular or a secure connection, your WebPAM PRO user name and password are always secure.

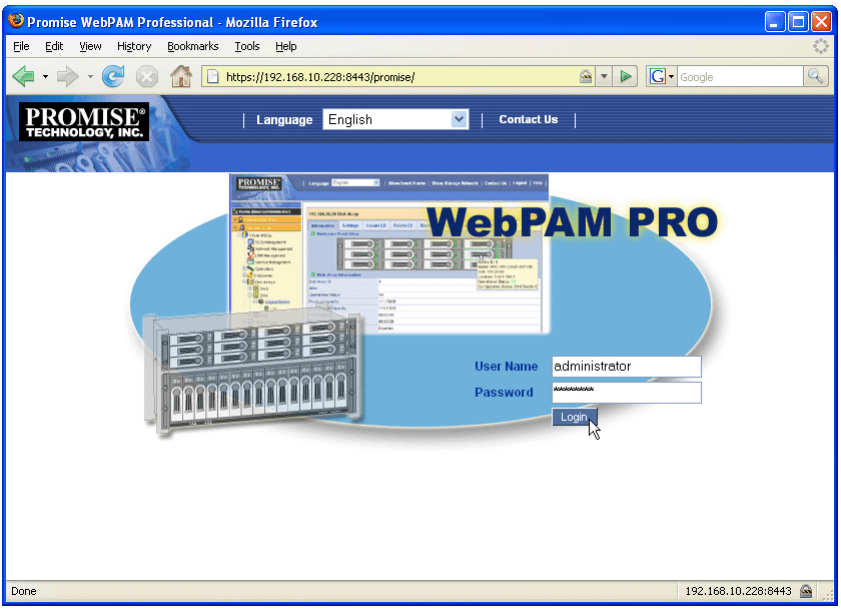
Login Screen

When the opening screen appears:

1. Type **administrator** in the User Name field.
2. Type **password** in the Password field.
3. Click the **Login** button.

   The User Name and Password are case sensitive. See Figure 24.

Figure 24. The WebPAM PRO login screen



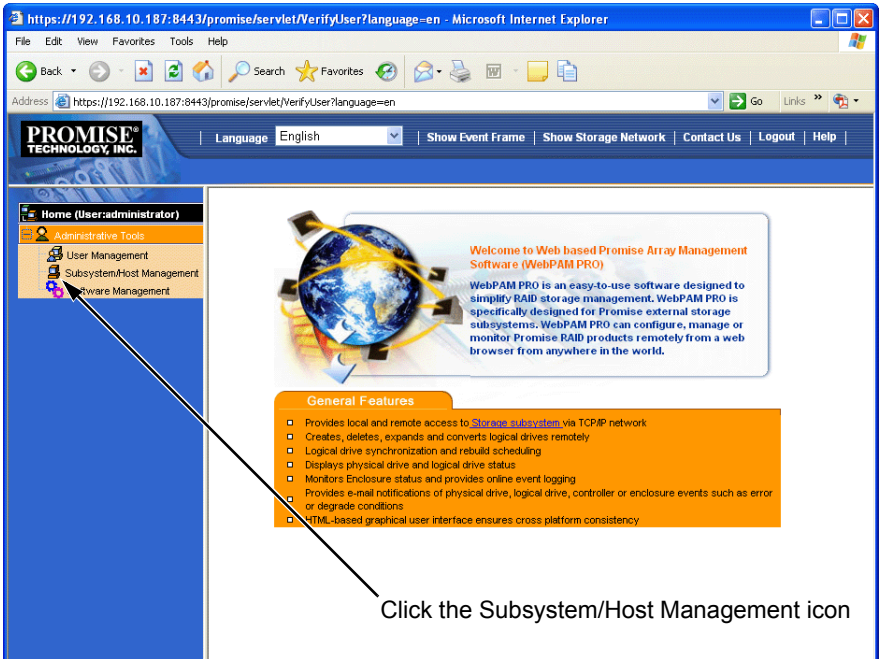
Setting up WebPAM PRO

The first time you use WebPAM PRO, you must add the Host PC so that WebPAM PRO will recognize it. You only need to perform this procedure once.

To add the Host PC:

1. In the Tree, click the Subsystem/Host Management icon.
   See Figure 25.

Figure 25. WebPAM PRO initial login screen

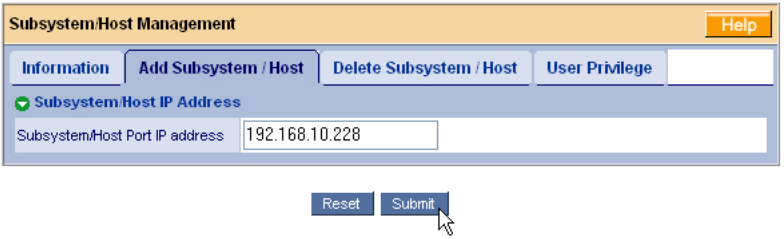

https://192.168.10.187:8443/promise/servlet/VerifyUser?language=en - Microsoft Internet Explorer
PROMISE TECHNOLOGY, INC.
Language
English
Show Event Frame
Show Storage Network
Contact Us
Logout
Help
Home (User:administrator)
Administrative Tools
User Management
Subsystem/Host Management
Welcome to Web based Promise Array Management Software (WebPAM PRO)
WebPAM PRO is an easy-to-use software designed to simplify RAID storage management. WebPAM PRO is specifically designed for Promise external storage subsystems. WebPAM PRO can configure, manage or monitor Promise RAID products remotely from a web browser from anywhere in the world.
General Features
Provides local and remote access to Storage subsystem via TCP/IP network
Creates, deletes, expands and converts logical drives remotely
Logical drive synchronization and rebuild scheduling
Displays physical drive and logical drive status
Monitors Enclosure status and provides online event logging
Provides e-mail notifications of physical drive, logical drive, controller or enclosure events such as error or degrade conditions
HTML-based graphical user interface ensures cross platform consistency
Click the Subsystem/Host Management icon

2. Click the **Add Subsystem/Host** tab.
3. In the Subsystem/Host Port IP address field, type the IP address of the Host PC where you installed the SuperTrak EX Controller card.

   If you are working at the same Host PC where the SuperTrak card is installed, you can also type **127.0.0.1** in the IP address field.

   Entries such as *localhost* or the Host PC's network name do not work for this function.

Figure 26. Add Subsystem/Host tab



4. Click the **Submit** button.

   The newly added host appears in the Tree, on the left side of the WebPAM PRO screen.

This completes the WebPAM PRO installation and initial setup. Go to “Chapter 5: Management with WebPAM PRO” on page 83 for information about using this application.

Chapter 3: Installing Drivers

- Driver Diskette for Windows (page 42)
- USB Memory Stick for Windows (page 42)
- Driver Diskette for Linux (page 42)
- Windows Vista
  - New OS Installation (page 43)
  - Existing System (page 44)
  - Confirming Driver Installation (page 44)
- Windows Server 2003
  - New OS Installation (page 45)
  - Existing System (page 46)
  - Confirming Driver Installation (page 46)
- Windows XP
  - New OS Installation (page 47)
  - Existing System (page 48)
  - Confirming Driver Installation (page 48)
- Windows 2000
  - New OS Installation (page 49)
  - Existing System (page 50)
  - Confirming Driver Installation (page 50)
- Red Hat Linux Enterprise 4.4, 4.5
  - New OS Installation (page 51)
  - Existing System (page 51)
- SuSE Linux Enterprise 10.1
  - New OS Installation (page 52)
  - Existing System (page 52)

Following are installation procedures for the Windows and Linux SuperTrak drivers included on the CD. Please download the latest drivers from the Promise website at http://www.promise.com/support.

Important

If you are using a Linux distribution for which there are no compiled drivers, please consult Knowledge Base Article 10029.

Driver Diskette for Windows

If you have a Windows PC and plan to install your SuperTrak driver from a diskette, follow this procedure. This procedure requires one write-enabled blank 3.5-inch diskette.

1. Place your blank diskette in the appropriate drive.
2. Insert the Promise CD into your CD-ROM drive.
3. Click **MyComputer > CD Drive D:** go to the Windows Driver folder.
4. Manually copy the driver files to your diskette.

USB Memory Stick for Windows

If you have a Windows PC and plan to install your SuperTrak driver from a USB memory stick, follow this procedure. This procedure requires one write-enabled USB memory stick.

1. Attach your USB memory stick to the USB port.
2. Insert the Promise CD into your CD-ROM drive.
3. Click **MyComputer > CD Drive D:** go to the Windows Driver folder.
4. Manually copy the driver files to your USB memory stick.

Driver Diskette for Linux

If you have a Linux PC and plan to install your SuperTrak driver from a diskette, follow this procedure. This procedure requires one write-enabled blank 3.5-inch diskette.

1. Place your blank diskette in the appropriate drive.
2. Insert the Promise CD into your CD-ROM drive.
3. Click **MyComputer > CD Drive D:** go to the Linux Driver folder.
4. Manually copy the driver **.tar.gz** file to your PC's hard drive.
5. Open a terminal window and untar the driver file.
6. Copy the driver file to the blank diskette.

Windows Vista

New OS Installation

The following details the installation of the SuperTrak EX Series RAID Controller drivers while installing Windows Vista.

1. Start the installation: Boot from the DVD-ROM.
2. When the “Where do you want to install Windows?” dialog box appears, click **Load Driver**.
3. Insert the SuperTrak driver diskette into drive A: or attach a USB memory stick with the SuperTrak driver to the USB port.
4. In the Load Driver dialog box, click the **Browse** button.
5. In the Browse for Folder dialog box, click the diskette or USB stick, then click the **OK** button.
6. In the “Select the driver to be installed” dialog box, highlight *Promise SuperTrak EX [4650, 8650] (tm) Controller*, then click the **Next** button.
7. When the “Where do you want to install Windows?” dialog box appears again, in the list of Disks, highlight the Disk representing your logical drive (the Disk with unallocated space), then click the **Next** button.
8. Continue the Windows installation.

Existing System

After installing the SuperTrak EX Series RAID Controller card and rebooting your system, Windows Vista setup will show a “Found New Hardware” dialog box. Under Windows Vista, “RAID Controller” will be displayed.

1. Insert the SuperTrak driver diskette into drive A: or attach a USB memory stick with the SuperTrak driver to the USB port.
2. Choose *Install the software automatically* and press the Enter key.
3. Choose *Promise SuperTrak EX [4650, 8650] (tm) Controller* from the list that appears on screen, and then press the Enter key.
4. If using a driver that has not been digitally signed by Microsoft, you will be asked if you want to continue the installation. Click **Continue anyway**.
5. When the New Hardware Wizard has finished installing the SuperTrak driver, click **Finish**.

Confirming Driver Installation

1. Right-click the My Computer icon and choose *Manage* from the popup menu.
2. From the left panel, choose *Device Manager*.
3. Click the **+** in front of Storage controllers. “Promise SuperTrak EX [4650, 8650] (tm) Controller” and “Promise Raid Console” should appear.

Windows Server 2003

New OS Installation

The following details the installation of the SuperTrak EX Series RAID Controller drivers while installing Windows Server 2003.

1. Start the installation:
   - Floppy Install: Boot the computer with the Windows Server 2003 installation diskettes.
   - CD-ROM Install: Boot from the CD-ROM. Press F6 after the message “Press F6 if you need to install third party SCSI or RAID driver” appears.
2. When the Windows Server 2003 Setup window is generated, press S to specify an Additional Device(s).
3. Insert the SuperTrak driver diskette into drive A: and press Enter.
4. Choose *Promise SuperTrak EX [4650, 8650] (tm) Controller* from the list that appears on screen, and then press the Enter.
5. Press S to use the driver on the floppy disk and then press Enter to continue with installation.
6. The Windows Server 2003 Setup screen will appear again saying “Setup will load support for the following mass storage devices:” The list will include “Promise SuperTrak EX [4650, 8650] (tm) Controller”.

   NOTE: If there are any additional devices to be installed, specify them now. When all devices are specified, continue to the next step.
7. From the Windows Server 2003 Setup screen, press the Enter. Setup will now load all device files and then continue the Windows Server 2003 installation.

Existing System

After installing the SuperTrak EX Series RAID Controller card and rebooting your system, Windows Server 2003 setup will show a “Found New Hardware” dialog box. Under Windows 2003, “RAID Controller” will be displayed.

1. Insert the SuperTrak driver diskette into the A:\ drive.
2. Choose *Install the software automatically* and press the Enter key.
3. Choose *Promise SuperTrak EX [4650, 8650] (tm) Controller* from the list that appears on screen, and then press the Enter key.
4. If using a driver that has not been digitally signed by Microsoft, you will be asked if you want to continue the installation. Click **Continue anyway**.
5. When the New Hardware Wizard has finished installing the SuperTrak driver, click **Finish**.

Confirming Driver Installation

1. Right-click the My Computer icon and choose *Manage* from the popup menu.
2. From the left panel, choose *Device Manager*.
3. Click the **+** in front of SCSI and RAID controllers. “Promise SuperTrak EX [4650, 8650] (tm) Controller” and “Promise Raid Console” should appear.

Windows XP

New OS Installation

The following details the installation of the SuperTrak EX Series RAID Controller drivers while installing Windows XP.

1. Start the installation:
   - Floppy Install: Boot the computer with the Windows XP installation diskettes.
   - CD-ROM Install: Boot from the CD-ROM. Press F6 after the message “Press F6 if you need to install third party SCSI or RAID driver” appears.
2. When the Windows XP Setup window is generated, press S to specify an Additional Device(s).
3. Insert the SuperTrak driver diskette into drive A: and press Enter.
4. Choose *Promise SuperTrak EX [4650, 8650] (tm) Controller* from the list that appears on screen, and then press the Enter.
5. Press S to use the driver on the floppy disk and then press Enter to continue with installation.
6. The Windows XP Setup screen will appear again saying “Setup will load support for the following mass storage devices:” The list will include “Promise SuperTrak EX [4650, 8650] (tm) Controller”.

   NOTE: If there are any additional devices to be installed, specify them now. When all devices are specified, continue to the next step.
7. From the Windows XP Setup screen, press the Enter. Setup will now load all device files and then continue the Windows XP installation.

Existing System

After installing the SuperTrak EX Series RAID Controller card and rebooting your system, Windows XP setup will show a “Found New Hardware” dialog box.

1. Insert the SuperTrak driver diskette into the A:\ drive.
2. Choose Install the software automatically and press the Enter key.
3. Choose *Promise SuperTrak EX [4650, 8650] (tm) Controller* from the list that appears on screen, and then press the Enter key.
4. If using a driver that has not been digitally signed by Microsoft, you will be asked if you want to continue the installation. Click **Continue anyway**.
5. When the New Hardware Wizard has finished installing the SuperTrak driver, click **Finish**.

Confirming Driver Installation

1. Right-click the My Computer icon and choose *Manage* from the popup menu.
2. From the left panel, choose *Device Manager*.
3. Click the **+** in front of SCSI and RAID controllers. “Promise SuperTrak EX [4650, 8650] (tm) Controller” and “Promise Raid Console” should appear.

Windows 2000

New OS Installation

The following details the installation of the SuperTrak EX Series RAID Controller drivers while installing Windows 2000.

1. Start the installation:
   - Floppy Install: Boot the computer with the Windows 2000 installation diskettes.
   - CD-ROM Install: Boot from the CD-ROM. Press F6 after the message “Press F6 if you need to install third party SCSI or RAID driver” appears.
2. When the Windows 2000 Setup window is generated, press S to specify an Additional Device(s).
3. Insert the SuperTrak driver diskette into drive A: and press Enter.
4. Choose *Promise SuperTrak EX [4650, 8650] (tm) Controller* from the list that appears on screen then press Enter.
5. The Windows 2000 Setup screen will appear again saying “Setup will load support for the following mass storage devices:” The list will include “Promise SuperTrak EX [4650, 8650] (tm) Controller”.

   Note: If there are any additional devices to be installed, specify them now. When all devices are specified, continue to the next step.
6. From the Windows 2000 Setup screen, press Enter. Setup will now load all device files and then continue the Windows 2000 installation.

Existing System

After installing the SuperTrak EX Series RAID Controller card and rebooting your system, Windows 2000 setup will show a “New Hardware Found” dialog box. Under Windows 2000, “PCI Mass Storage Controller” will be displayed.

1. Choose Add New Hardware Wizard from the list, and then press Enter.
2. Choose Add/Troubleshoot a device and click **Next**. The new hardware wizard will show device list
3. Choose Mass Storage controller and click **Next**. At the following screen click **Finish**.
4. Choose Display a list the known drivers for this device so that I can choose a specific driver then click **Next**.
5. When the Windows 2000 supported SCSI adapter drivers list appears, click **Have disk**.
6. Insert the SuperTrak driver diskette in drive A:\.
7. Type **A:\Win2000** in the text box. Click **OK**.
8. Choose *Promise SuperTrak EX [4650, 8650] (tm) Controller* from the list that appears on screen, then click **Next**.
9. Click **Yes** to confirm continue the installation and copy the driver to system.
10. Remove the diskette and click **Finish** to restart the system.

    Windows 2000 will then restart for the driver installation to take effect.

Confirming Driver Installation

1. Right-click the My Computer icon and choose *Manage* from the popup menu.
2. From the left panel, choose *Device Manager*.
3. Click the **+** in front of SCSI controllers. “Promise SuperTrak EX [4650, 8650] (tm) Controller” and “Promise Raid Console” should appear.

Red Hat Linux Enterprise 4.4, 4.5

New OS Installation

1. Start the RedHat Linux Installation by booting from the install CD.
2. At the “Welcome to Red Hat Linux...” installation screen, a prompt labeled **boot:** will appear at the bottom of the screen. Type **linux dd** and press Enter.
3. When the Installer asks, “Do you have a driver disk?” click **Yes**.
4. At the “Insert your driver disk and press OK to continue,” insert the driver diskette into the floppy drive and click **OK**.

   At the Devices dialog box, insert the SuperTrak driver diskette in the floppy drive and click **OK**.
5. When the Devices dialog box appears, choose *Add Device*.
6. When the Installer asks, “What kind of device would you like to add?” choose *SCSI*.
7. Scroll down to the *Promise SuperTrak EX [4650, 8650] (tm) Controller* and click **OK**.
8. When the Installer displays *Promise SuperTrak EX [4650, 8650] (tm) Controller* has been found, click **Done**.
9. Continue with the installation normally.

Note: Check the readme file, included with the downloaded driver files, for instructions on installing the RAID Console.

Existing System

1. Insert SuperTrak driver diskette into the floppy drive.
2. Log in as *root*.
3. Type **mount -r /dev/fd0 /mnt/floppy**.
4. Type **cd /mnt/floppy**
5. Type **sh ./install**.
6. When the Installer asks, “You are installing a driver on an existing OS. Is it true (y/n)?” press Y, then press Enter.
7. Type **cd; umount /mnt/floppy**.
8. Remove the SuperTrak Driver Diskette.
9. Type **reboot** to restart the system.

SuSE Linux Enterprise 10.1

New OS Installation

1. Start the SuSE Linux Installation by booting from the install CD.
2. As the system boots, press F5 for the Driver Disk.
3. Move the cursor to the *Installation – ACPI Disabled* option, and press Enter.
4. When the installer displays, “Please insert the Driver Update floppy/ CDROM,” insert the SuperTrak driver disk, then press Enter.
5. When the Driver Update Menu pops up, click **OK**, then click **Back** to return to the installer.
6. Follow the on-screen prompts to complete the installation.

Existing System

1. Insert the SuperTrak driver diskette into the floppy drive.
2. Log in as *root*.
3. Type **mount /dev/fd0 /media/floppy**.
4. Type **cd /media/floppy**
5. Type **./install**.
6. Type **cd; umount /media/floppy**.
7. Remove the SuperTrak driver diskette.
8. Type **reboot** to restart the system.

Chapter 4: SuperBuild™ Utility

- SuperTrak BIOS (below)
- Main Menu (page 56)
- Controller Selection (page 57)
- Controller Information (page 58)
- Physical Drive Management (page 59)
- Disk Array Management (page 61)
- Logical Drive Management (page 64)
- Managing Logical Drive Problems (page 68)
- Spare Drive Management (page 73)
- Background Activity (page 76)
- Event Log (page 77)
- Time Sync (page 79)
- Miscellaneous (page 80)

SuperTrak BIOS

This section explains the information that you can obtain from the SuperTrak BIOS.

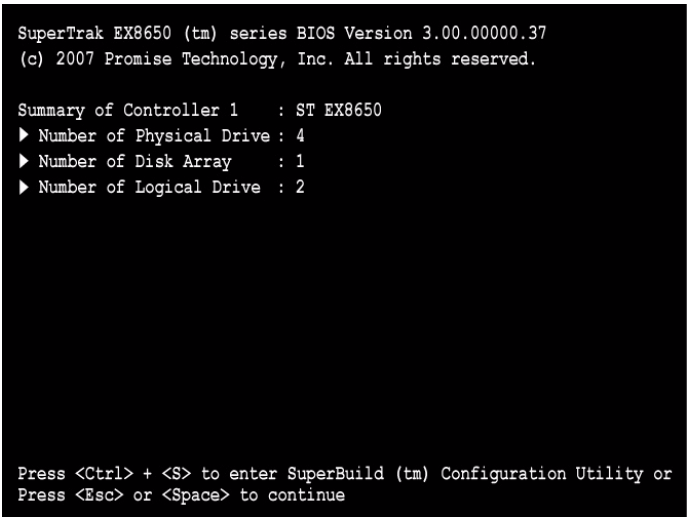
When the SuperTrak BIOS loads during bootup, the BIOS displays pertinent information about the RAID logical drives. At this point, press Ctrl-S to enter the SuperBuild Configuration Utility.

The SuperTrak BIOS screen displays the following information:

- **Summary of Controller** – The SuperTrak controller model number.
- **Number of Physical Drives** – The number of physical drives attached to this controller.
- **Number of Disk Arrays** – The number of disk arrays managed by this controller.
- **Number of Logical Drives** – The number of logical drives managed by this controller.

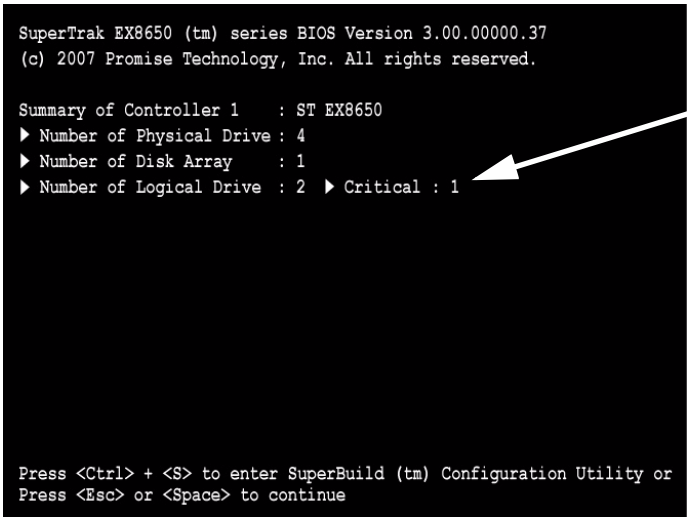
See Figure 1.

Figure 1. SuperTrak BIOS screen


SuperTrak EX8650 (tm) series BIOS Version 3.00.00000.37
(c) 2007 Promise Technology, Inc. All rights reserved.
Summary of Controller 1 : ST EX8650
▶ Number of Physical Drive : 4
▶ Number of Disk Array : 1
▶ Number of Logical Drive : 2
Press <Ctrl> + <S> to enter SuperBuild (tm) Configuration Utility or
Press <Esc> or <Space> to continue

If the SuperBuild BIOS detects a *Critical* logical drive, the BIOS reports the condition:

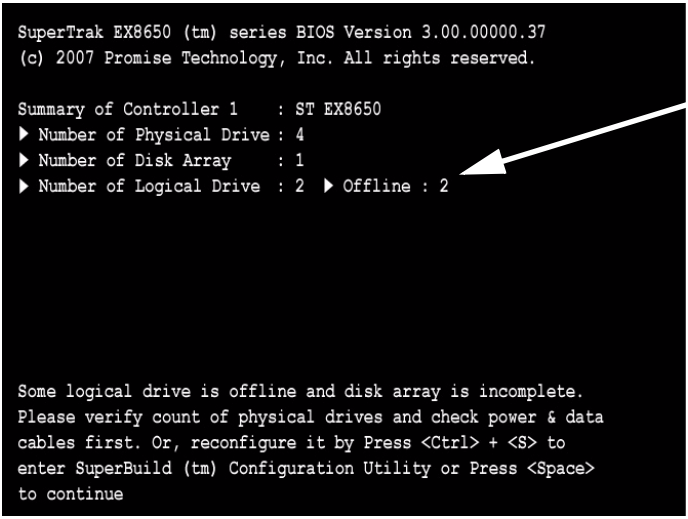
Figure 2. SuperTrak BIOS screen, logical drive critical


SuperTrak EX8650 (tm) series BIOS Version 3.00.00000.37
(c) 2007 Promise Technology, Inc. All rights reserved.
Summary of Controller 1 : ST EX8650
▶ Number of Physical Drive : 4
▶ Number of Disk Array : 1
▶ Number of Logical Drive : 2 ▶ Critical : 1
Press <Ctrl> + <S> to enter SuperBuild (tm) Configuration Utility or
Press <Esc> or <Space> to continue

See “Managing Logical Drive Problems” on page 68 for information about rebuilding a critical logical drive. Press Ctrl-S to access the SuperBuild utility.

If the SuperTrak BIOS detects an *Offline* logical drive, the BIOS reports the condition and temporarily halts the booting process of the Host PC, so you can access the SuperBuild utility to investigate.

Figure 3. SuperTrak BIOS screen, logical drive offline


SuperTrak EX8650 (tm) series BIOS Version 3.00.00000.37
(c) 2007 Promise Technology, Inc. All rights reserved.
Summary of Controller 1 : ST EX8650
Number of Physical Drive : 4
Number of Disk Array : 1
Number of Logical Drive : 2 Offline : 2
Some logical drive is offline and disk array is incomplete.
Please verify count of physical drives and check power & data
cables first. Or, reconfigure it by Press <Ctrl> + <S> to
enter SuperBuild (tm) Configuration Utility or Press <Space>
to continue

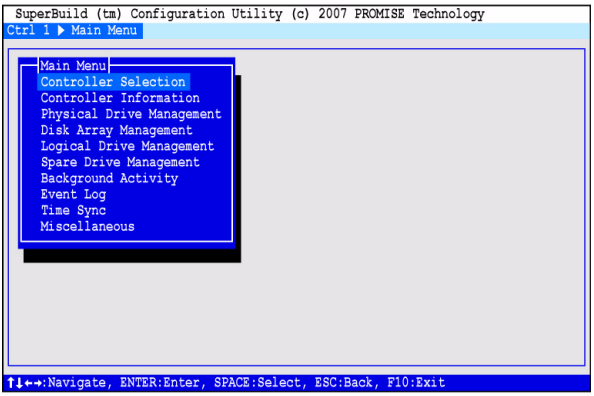
You can use the SuperBuild Utility to diagnose the problem. See “Managing Logical Drive Problems” on page 68. Press Ctrl-S to access the SuperBuild utility.

You can also boot through to your operating system and use WebPAM PRO to diagnose the problem. See “Chapter 5: Management with WebPAM PRO” on page 83.

Main Menu

The opening screen of the SuperBuild utility is the Main Menu.

Figure 4. SuperBuild Main Menu



The Main Menu (above) has nine options:

- **Controller Selection** – Select which of two SuperTrak controllers you want to access, if you have two SuperTraks installed in the Host PC
- **Controller Information** – Memory type and size, Firmware and BIOS version numbers, and address information that may be helpful for diagnostic purposes
- **Physical Drive Management** – A list of physical drives attached to the SuperTrak controller, their ID (channel) numbers, model numbers, capacity, and status
- **Disk Array Management** – A list of disk arrays attached to the SuperTrak controller, the assigned physical drives, logical drives, capacity, and status
- **Logical Drive Management** – A list of logical drives plus create and delete logical drive functions
- **Spare Drive Management**– A list of hot spare drives, their characteristics and status
- **Background Activity** – A list of logical drives, any current background activity, logical drive status and percentage of activity completed. Background activities include: Rebuild, Initialize, Synchronize, Migrate, and Pause/Resume
- **Event Log** – A list of events stored in RAM (since startup) or non-volatile RAM (since the log was cleared) for diagnosis
- **Time Sync** – Enables you to set the time zone and synchronize system time and date with the embedded site

- **Miscellaneous** – SAS drive LEDs, enclosure management, and buzzer settings

Controller Selection

The SuperBuild Configuration utility supports up to two SuperTrak RAID Controller cards installed in the same Host PC. Controller selection enables you to select which of the two SuperTrak controllers the utility accesses.

If you have only one SuperTrak card installed in the Host PC, the SuperTrak is Controller 1, and no selection is necessary.

If you have two SuperTrak cards installed in the Host PC, take the following action to select one of them:

1. In the Main Menu, highlight *Controller Selection* and press Enter.
2. Highlight *Controller 1* or *Controller 2* and press Enter.

   The selected controller (SuperTrak card) displays in the SuperBuild utility.

Controller Information

The SuperBuild utility displays information about the selected SuperTrak EX controller.

1. In the Main Menu, highlight *Controller Information* and press Enter.

   The information includes:

   Vendor – Promise Technology, Inc.

   Model – SuperTrak EX4650 or EX8650

   WWN – World Wide Number of the SuperTrak controller

   Memory Type – DDR2 SDRAM

   Memory Size – 128 MB or 256 MB

   Single Image Ver – The version number of the image used to update the firmware on the SuperTrak EX controller.*

   Firmware Version – The version number of the firmware currently installed on the SuperTrak EX controller.*

   BIOS Version – The version number of the BIOS currently installed on the SuperTrak EX controller.*

   PCI Func Address – The functional address of the SuperTrak card in the Host PC. Used for advanced diagnostics

   * The BIOS and Firmware are upgradable. See “Downloading BIOS and Firmware File” on page 207 and See “Updating the Firmware” on page 105.

2. Highlight *Return to Previous Menu* and press Enter.

Physical Drive Management

Physical drive management includes these functions:

- Viewing Physical Drives (page 59)
- Viewing Physical Drive Information (page 59)
- Managing Physical Drive Problems (page 60)

Viewing Physical Drives

To view physical drives:

1. In the Main Menu, highlight *Physical Drive Management* and press Enter.

   The information includes:

   ID – The channel number of the SuperTrak controller to which the physical drive is attached

   Model Name – The physical drive manufacturer's model name for the drive

   Capacity – Data capacity of the physical drive in GB

   Status – OK is normal. Can also show Rebuilding or Dead.
2. Highlight *Return to Previous Menu* and press Enter.

Viewing Physical Drive Information

The SuperBuild utility displays information about the physical (disk) drives attached to the SuperTrak controller.

1. In the Main Menu, highlight *Physical Drive Management* and press Enter.
2. Highlight the physical drive you want to see and press Enter.

   The Physical Drive Information screen displays:

   ID – The channel number of the SuperTrak controller to which this physical drive is attached.

   Model Name – The drive manufacturer's model name.

   Serial Number – The drive manufacturer's serial number.

   Firmware Version – The drive's firmware version number.

   Drive Interface – SAS or SATA, 3.0 or 1.5 Gb/s

   Protocol – ATA/ATAPI protocol level.

   Capacity – Data capacity of the physical drive in GB.

   Location – Enclosure refers to the Host PC. Slot refers to the channel number of the SuperTrak controller.

   Configuration – Disk array number and sequence number, Type of spare drive, or Unconfigured.

   Status – OK is normal. Can also show Rebuilding, Stale, or Dead.

3. Highlight *Return to Previous Menu* and press Enter.

Managing Physical Drive Problems

Physical drives can develop problems that make them unsuitable for service in a disk array. These problems are reflected in the physical drive status. Two such status conditions are:

- **Stale** – Caused by obsolete array information on the physical drive
- **Dead** – Physical drive set down by the SuperTrak controller

In some cases, you can use WebPAM PRO to restore such physical drives to OK status. See “Clearing Stale and PFA Conditions” on page 125 and “Forcing a Physical Drive Offline or Online” on page 125.

Disk Array Management

Disk array management includes these functions:

- Viewing Disk Arrays (page 61)
- Viewing Disk Array Information (page 61)
- Creating a Disk Array (page 62)
- Changing Disk Array Settings (page 63)
- Rebuilding a Disk Array (page 63)
- Deleting a Disk Array (page 63)

Viewing Disk Arrays

The SuperBuild utility displays information about the disk arrays managed by the SuperTrak controller.

1. In the Main Menu, highlight *Disk Array Management* and press Enter.

   The information includes:

   ID – The consecutive number of the disk array in the order it was created, beginning with 0.

   Disk Array Name – The name you assigned to the disk array.

   Capacity – Data capacity of the disk array in GB.

   Status – OK is normal. Can also show Rebuilding, Degraded, Critical, or Offline.
2. Highlight *Return to Previous Menu* and press Enter.

Viewing Disk Array Information

To view disk array information:

1. In the Main Menu, highlight *Disk Array Management* and press Enter.

   The Disk Array Management screen displays.
2. Highlight the Disk Array you want to see and press Enter.

   The Disk Array Info and Setting screen displays. The information includes:

   Disk Array ID – The consecutive number of the disk array in the order it was created, beginning with 0

   Disk Array Name – The name you assigned to the disk array

   Capacity (Free) – Total data capacity of the disk array in GB

   Capacity (Configurable) – Usable data capacity of the disk array in GB

   Number of Physical Drives – Number of physical drives in this disk array

   Number of Logical Drives – Number of logical drives in this disk array

Status – OK is normal. Can also show Rebuilding, Degraded, Critical, or Offline.

3. Highlight *Physical Drives in the Disk Array* and press Enter.

   The following information displays:

   ID – The channel number of the SuperTrak controller to which the physical drive is attached

   Model Name – The physical drive manufacturer's model name for the drive

   Capacity – Data capacity of the physical drive in GB

   Status – OK is normal. Can also show Rebuilding or Dead.

4. Highlight *Logical Drives in the Disk Array* and press Enter.

   The following information displays:

   ID – The consecutive number of the logical drive in the order it was created, beginning with 0

   Logical Drive Name – The user-assigned name for the logical drive

   Capacity – Data capacity of the logical drive in GB

   Status – Shows one of seven logical drive conditions: OK, Critical, Offline, Init, Migration, Synchron, and Rebuild.

5. Highlight *Return to Previous Menu* and press Enter.

Creating a Disk Array

1. In the Main Menu, highlight *Disk Array Management* and press Enter.

   The Disk Array Management screen displays.

2. Highlight *Create Disk Array* and press Enter.

   The Create Disk Array screen displays.

3. Optional. Press the arrow keys to highlight *Disk Array Name* and press Enter. Then type a name for this disk array.

4. Press the arrow keys to highlight the physical drives you want to add to this disk array. Then press the spacebar to select the physical drives.

   An asterisk (*) appears at the left of each selected physical drive.

5. Highlight *Save Configuration* and press Enter.

   The new disk array appears under Disk Array Management. If you have more physical drives available, you can create additional disk arrays following the same procedure.

   After you have created your disk arrays, Your next action is to create one or more logical drives. See “Creating a Logical Drive” on page 65.

Changing Disk Array Settings

To change the name of a disk array:

1. In the Main Menu, highlight *Disk Array Management* and press Enter.

   The Disk Array Management screen displays.
2. Highlight the Disk Array you want to change and press Enter.

   The Disk Array Info and Setting screen displays.
3. Highlight *Disk Array Name* and press Enter.
4. Press the backspace or delete keys to remove the characters. Then type new characters.
5. Highlight *Save Setting* and press Enter.
6. Highlight *Return to Previous Menu* and press Enter.

Rebuilding a Disk Array

See “Managing Logical Drive Problems” on page 68.

Deleting a Disk Array

Warning

When you delete a disk array, you delete the logical drives and all of the data on them. Be sure to backup any important data before you delete a disk array!

To delete a disk array:

1. In the Main Menu, highlight *Disk Array Management* and press Enter.

   The Disk Array Management screen displays.
2. Highlight the disk array you want to delete and press the spacebar to mark the disk array.

   An asterisk (*) appears at the left of the selected disk array.
3. Highlight *Delete Selected Disk Arrays* and press Enter.
4. Press Y to confirm disk array deletion.

   The selected disk array is removed from the list.

Logical Drive Management

Logical drive management includes these functions:

- Viewing Logical Drives (page 64)
- Viewing Logical Drive Information (page 64)
- Creating a Logical Drive (page 65)
- Initializing a Logical Drive (page 66)
- Changing Logical Drive Settings (page 67)
- Deleting a Logical Drive (page 67)

Note

For an explanation of the logical drive concepts and the choices you can make when you create your logical drive, see

Viewing Logical Drives

To view your logical drives:

1. In the Main Menu, highlight *Logical Drive Management* and press Enter.

   The Logical Drive Management screen displays the following information:

   ID – The consecutive number of the logical drive in the order it was created, beginning with 0

   Logical Drive Name – The user-assigned name for the logical drive

   Capacity – Data capacity of the logical drive in GB

   Status – OK is normal. Can also show Rebuilding, Initializing, Synchronizing, Degraded, Critical, or Offline.
2. Highlight *Return to Previous Menu* and press Enter.

Viewing Logical Drive Information

To view logical drive information:

1. In the Main Menu, highlight *Logical Drive Management* and press Enter.

   The Logical Drive Management screen displays.
2. Highlight the logical drive you want to see and press Enter.

   The Logical Drive Info and Setting screen displays. The information includes:

   Logical Drive ID – The consecutive number of the logical drive in the order it was created, beginning with 0.

   Logical Drive Name – You can change this setting.

   Capacity – Data capacity of the logical drive in GB

RAID Level – Chosen when the logical drive was created.

Stripe Size – Chosen when the logical drive was created.

Sector Size – Chosen when the logical drive was created.

Write Cache Policy – You can change this setting.

Read Cache Policy – You can change this setting.

Disk Array ID – Consecutive number of the disk array to which this logical drive belongs

Status – OK is normal. Can also show Rebuilding, Initializing, Synchronizing, Degraded, Critical, or Offline.

3. Highlight *Return to Previous Menu* and press Enter.

Creating a Logical Drive

You must create a disk array before you can create a logical drive. See “Creating a Disk Array” on page 62.

To create a logical drive:

1. In the Main Menu, highlight *Logical Drive Management* and press Enter.

   The Logical Drive Management screen displays.

2. Highlight *Create Logical Drive* and press Enter.

   The Create Logical Drive Step 1/2 screen appears.

3. Press the arrow keys to highlight a disk array. Then press the spacebar to select the disk array.

   An asterisk (*) appears at the left of the selected disk array.

   Highlight *Next Step* and press Enter.

   The Create Logical Drive Step 2/2 screen displays.

4. Press the arrow keys to highlight the item you want to change, then press Enter to select the item:
   - **Logical Drive Name** – Optional. Type a name.
   - **RAID Level** – Choose a new RAID level. Your choices depend upon the number of physical drives in your disk array.
   - **Capacity** – 0 means the full capacity or the remaining capacity of the disk array will be used for this logical drive.
   - **Stripe Size** – *Choose from 64 KB, 128 KB, 256 KB, 512 KB, and* 1 MB. 64 KB is the default.
   - **Sector Size** – Choose from *512 B*, *1 KB*, *2 KB*, and *4 KB*. 512 B is the default.
   - **Write Cache Policy** – Choose from *Write Back* or *Write Through*.

- **Read Cache Policy** – Choose from *Read Cache*, *Read Ahead*, or *No Cache*.
- **Axle** – RAID 50 and 60 logical drives only. Choose the number of axles or choose 0 to let the controller decide for you.

5. Highlight *Save Configuration* and press Enter.

   At this point you can create additional logical drives, if there is space remaining on your disk arrays. To create another logical drive, repeat steps 2 though 5 above.

6. Press the F10 key to exit the SuperBuild utility and press Y to confirm and restart the computer.

   Do not press the Ctrl-Alt-Del keys. Do not press the Esc key.

Important

- Promise recommends that you Initialize your logical drives immediately after you create them.
- You must be partition and format your new logical drives before your operating system will recognize them.

Initializing a Logical Drive

Promise recommends that you Initialize your logical drives immediately after you create them. Initialization sets all data bits in the logical drive to zero, removing any residual data left behind from earlier configurations. You can also perform an Initialization on an existing logical drive.

Warning

When you initialize a logical drive, you delete all data on the logical drive. Be sure to backup any important data before you initialize a logical drive!

1. In the Main Menu, highlight *Logical Drive Management* and press Enter.

   The Logical Drive Management screen displays.

2. Highlight the logical drive you want to initialize and press Enter.
3. Highlight *Initialization Start* and press Enter.

   A message appears at the bottom of the screen.

4. Choose one of the following actions:
   - For a Full Initialization, press F.
   - For a Quick Initialization, press Q.
   - To cancel Initialization, press C.

The Initialization begins immediately. If you set Initialization for multiple logical drives, they will be initialized sequentially. You can monitor Initialization progress under Background Activity.

5. Highlight *Return to Previous Menu* and press Enter.

Changing Logical Drive Settings

To change logical drive settings:

1. In the Main Menu, highlight *Logical Drive Management* and press Enter.

   The Logical Drive Management screen displays.

2. Highlight the logical drive whose settings you want to change and press Enter.

   The Logical Drive Info and Setting screen displays.

3. Press the arrow keys to highlight the item you want to change, then press Enter to select the item:
   - **Logical Drive Name** – Press the backspace or delete keys to remove the characters. Then type new characters.
   - **Write Cache Policy** – Choose from *Write Back* or *Write Through*.
   - **Read Cache Policy** – Choose from *Read Cache*, *Read Ahead*, or *No Cache*.
4. Highlight *Save Setting* and press Enter.

   The changes happen immediately.

Deleting a Logical Drive

Warning

When you delete a logical drive, you delete all data on the logical drive. Be sure to backup any important data before you delete a logical drive!

To delete a logical drive:

1. In the Main Menu, highlight *Logical Drive Management* and press Enter.

   The Logical Drive Management screen displays.

2. Highlight the logical drive you want to delete and press the spacebar to mark the logical drive.

   An asterisk (*) appears at the left of the selected logical drive.

3. Highlight *Delete Selected Logical Drives* and press Enter.
4. Press Y to confirm logical drive deletion.

   The selected logical drive is removed from the list.

Managing Logical Drive Problems

The most common logical drive problems are caused by physical disk drive failure, resulting in a Critical or an Offline logical drive.

Managing logical drive problems includes the following actions:

- Identifying a Critical Logical Drive (page 68)
- Rebuilding the Logical Drive (page 69)
- Finding the Failed Physical Drive (page 70)
- Identifying an Offline Logical Drive (page 70)

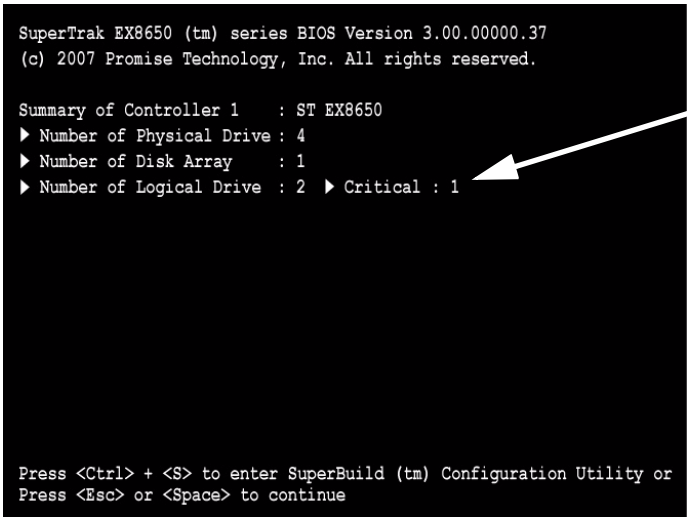
Identifying a Critical Logical Drive

A critical logical drive has lost its fault tolerance but the logical drive can still read and write data.

- RAID 1, 5, 10, and 50 logical drives go critical when one physical drive fails.
- RAID 6 and 60 logical drives go *degraded* when one physical drive fails and critical when two physical drives fail. You take the same action in either case.

When you boot your system, the SuperTrak BIOS screen informs you if there is a critical logical drive.

Figure 5. SuperTrak BIOS screen, logical drive critical


SuperTrak EX8650 (tm) series BIOS Version 3.00.00000.37
(c) 2007 Promise Technology, Inc. All rights reserved.
Summary of Controller 1 : ST EX8650
▶ Number of Physical Drive : 4
▶ Number of Disk Array : 1
▶ Number of Logical Drive : 2 ▶ Critical : 1
Press <Ctrl> + <S> to enter SuperBuild (tm) Configuration Utility or
Press <Esc> or <Space> to continue

Rebuilding the Logical Drive

The remedial action for a critical logical drive is to rebuild it, meaning the data from the failed drive is rebuilt onto the replacement drive. The SuperTrak controller does this action automatically using a spare drive. If you do not have a spare drive, the controller will do it when you install a replacement drive.

Spare Drive Available

The SuperTrak Controller will rebuilt a logical drive automatically using a spare drive, providing:

- A spare drive is available
- The spare drive is the same size or larger than the failed drive
- The Auto Rebuild setting is enabled in WebPAM PRO. Enabled is the default setting. See “Making Background Activity Settings” on page 109.

If the above conditions are met, the SuperTrak controller automatically rebuilds the logical drive with the hot spare. After the rebuild is done, you must replace the failed drive with a new physical drive.

Depending on your spare drive settings, you might make the replacement drive the new spare drive, or the original spare will transition back to its original status. See “Creating a Spare Drive” on page 73.

No Spare Drive Available

If a spare drive is not available, you must replace the failed drive. Then the SuperTrak controller will automatically rebuild the logical drive using the new physical drive, providing:

- The new drive is the same size or larger than the failed drive
- The Auto Rebuild setting is enabled in WebPAM PRO. Enabled is the default setting. See “Making Background Activity Settings” on page 109.

Manual Rebuild

In some cases, you must start the Rebuild manually. After replacing the failed drive with a new drive of equal or larger size, take the following actions:

1. In the Main Menu, highlight *Disk Array Management* and press Enter.
   The Disk Array Management screen displays.
2. Highlight the Disk Array with the failed drive and press Enter.
   The Disk Array Info and Setting screen displays.
3. Highlight Physical Drives in the Array and press Enter.
   Note the ID numbers of the physical drives that are still functional
4. Highlight *Start Manual Rebuild* and press Enter.
   The Manual Rebuild screen displays.

5. Highlight the *Source Sequence Number* and press Enter. Then type the ID number of one of the physical drives you noted in step 3 and press Enter.
6. Highlight the *Target Physical Drive ID* and press Enter. Then type the ID number of the new drive and press Enter.
7. Highlight *Start Manual Rebuild* and press Enter.

   The time required for the Rebuild depends on the number and size of your logical drives. You can monitor the progress of the Rebuild under Background Activity.

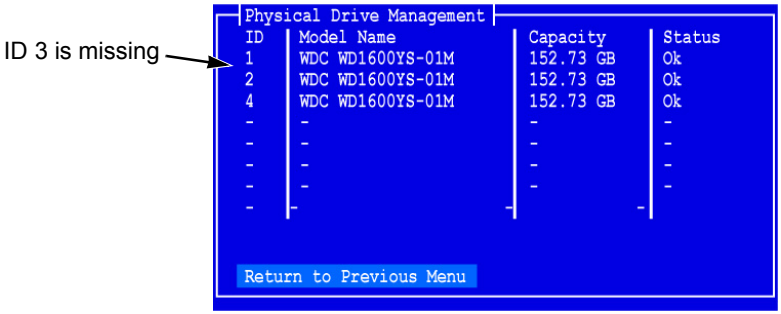
Finding the Failed Physical Drive

To identify a failed physical drive:

1. In the Main Menu, highlight *Physical Drive Management* and press Enter.

   The Physical Drive Management screen displays.
2. Compare the list of physical drives on the screen against the actual physical drives attached to the SuperTrak controller.

Figure 6. Physical Drive Management screen



In the example above, there is no physical drive for ID 3. Assuming you installed a physical drive onto Channel 3 of the SuperTrak controller, this is the failed physical drive.

Identifying an Offline Logical Drive

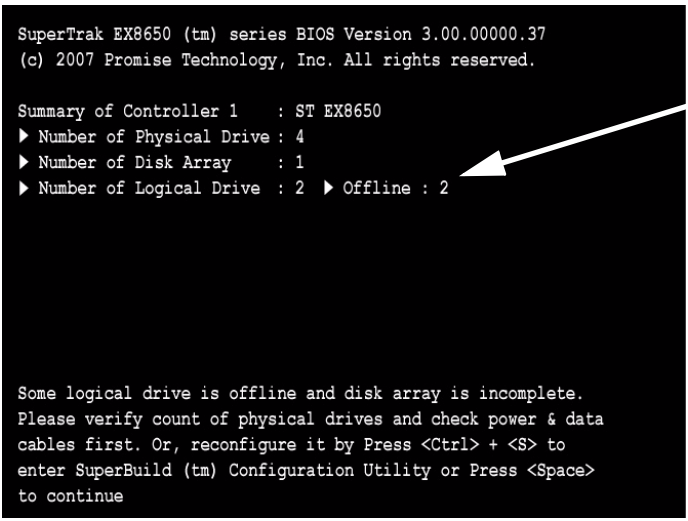
An offline logical drive cannot read or write data.

- RAID 0 logical drives go offline when one physical drive fails.
- RAID 1, 5, 10, and 50 logical drives go offline when two physical drives fail.
- RAID 6 and 60 logical drives go offline when three physical drives fail.

When you boot your system, the SuperTrak BIOS screen informs you if there is an offline logical drive. If the SuperTrak BIOS detects an offline logical drive, the

BIOS reports the condition and temporarily halts the booting process of the Host PC, so you can access the SuperBuild utility to investigate.

Figure 7. SuperTrak BIOS screen, logical drive offline


SuperTrak EX8650 (tm) series BIOS Version 3.00.00000.37
(c) 2007 Promise Technology, Inc. All rights reserved.
Summary of Controller 1 : ST EX8650
▶ Number of Physical Drive : 4
▶ Number of Disk Array : 1
▶ Number of Logical Drive : 2 ▶ Offline : 2
Some logical drive is offline and disk array is incomplete.
Please verify count of physical drives and check power & data
cables first. Or, reconfigure it by Press <Ctrl> + <S> to
enter SuperBuild (tm) Configuration Utility or Press <Space>
to continue

1. Press Ctrl-S to access the SuperBuild utility.
2. From the Main Menu, highlight *Physical Drive Management* and press Enter.
3. Verify that all of the physical drives attached to the SuperTrak controller appear under on the Physical Drive Management screen. See “Finding the Failed Physical Drive” on page 70.
    - If ALL physical drives appear, but they show a status of *Stale* or *Dead*, see “Managing Physical Drive Problems” on page 60.
    - If one or more physical drives do NOT appear, shut down the Host PC, open the case, check the power and data connections to each physical drive, correct any shortcomings, restart the Host PC and check in SuperBuild again.

RAID 1, 5, 6, 10, 50 and 60

You cannot rebuild an offline logical drive. However, if you can restore one of the failed physical drives, the logical drive will be critical, then you can rebuild it. See “Rebuilding the Logical Drive” on page 69.

RAID 0

Because RAID 0 logical drives are not fault-tolerant, there is no way to rebuild the logical drive when a physical drive fails.

See “Managing Physical Drive Problems” on page 60 to determine if there is any way to salvage the physical drive and restore your logical drive.

If the physical drive cannot be salvaged, replace the drive, then create a new logical drive and copy your data to the logical drive from a backup source.

Spare Drive Management

Spare drive management includes these functions:

- Viewing Spare Drives (page 73)
- Viewing Spare Drive Information (page 73)
- Creating a Spare Drive (page 73)
- Changing Spare Drive Settings (page 74)
- Deleting a Spare Drive (page 75)

Viewing Spare Drives

To view your spare drives:

1. In the Main Menu, highlight *Spare Drive Management* and press Enter.

   ID – The consecutive number of the spare drive in the order it was created, beginning with 0

   Model Name – The physical drive manufacturer's model name

   Capacity – Data capacity of the physical drive in GB

   Status – OK is normal. Can also show Rebuilding or Dead.
2. Highlight *Return to Previous Menu* and press Enter.

Viewing Spare Drive Information

To view spare drive information:

1. In the Main Menu, highlight *Spare Drive Management* and press Enter.

   The Spare Drive Management screen displays.
2. Highlight the spare drive you want to see and press Enter.

   The Spare Drive Info and Setting screen displays. The information includes:

   Physical Drive ID – The channel number of the SuperTrak controller to which the physical drive is attached.

   Revertible – Yes or No.

   Spare Type – Global or Dedicated.

   Disk Array – ID, name, capacity, and status, for spare drives dedicated to an array
3. Highlight *Return to Previous Menu* and press Enter.

Creating a Spare Drive

For a physical drive to qualify as a spare, the drive must be:

- Unconfigured – Not part of an array
- Functional – Showing OK status

- Big Enough – Same capacity or greater than the largest drive in your array

To create a spare drive:

1. In the Main Menu, highlight *Spare Drive Management* and press Enter.

   The Spare Drive Management screen displays.
2. Highlight *Assign Spare Drive* and press Enter.

   The Assign Spare Drive Step 1/2 screen appears.
3. Press the arrow keys to highlight a physical drive. Then press the spacebar to select the physical drive.

   An asterisk (*) appears at the left of the selected physical drive.

   Highlight *Next Step* and press Enter.

   The Assign Spare Drive 2/2 screen displays.
4. Press the arrow keys to highlight the item you want to change, then press Enter to select the item:
   - **Revertible** – *Yes* or *No*. A revertible spare drive automatically returns to its spare drive assignment after the failed physical drive in the disk array is replaced. Go to step 6.
   - **Spare Type** – *Global*, can be used by any disk array. *Dedicated*, can only be used by the assigned disk array. Go to step 5.
5. Optional. If you chose *Dedicated* in step 4, press the arrow keys to highlight a disk array. Then press the spacebar to select the disk array.

   An asterisk (*) appears at the left of the selected disk array.
6. Highlight *Save Configuration* and press Enter.

Changing Spare Drive Settings

You can change a spare drive's revertibility and type. To change spare drive settings:

1. In the Main Menu, highlight *Spare Drive Management* and press Enter.

   The Spare Drive Management screen displays.
2. Highlight the spare drive whose settings you want to change and press Enter.

   The Spare Drive Info and Setting screen displays.
3. Press the arrow keys to highlight the item you want to change, then press Enter to select the item:
   - **Revertible** – *Yes* or *No*. A revertible spare drive automatically returns to its spare drive assignment after the failed physical drive in the disk array is replaced. Go to step 5.
   - **Spare Type** – *Global*, can be used by any disk array. *Dedicated*, can only be used by the assigned disk array. Go to step 4.

4. Optional. If you chose *Dedicated* in step 3, press the arrow keys to highlight a disk array. Then press the spacebar to select the disk array.

   An asterisk (*) appears at the left of the selected disk array.

5. Highlight *Save Setting* and press Enter.

   The changes happen immediately.

Deleting a Spare Drive

To delete a spare drive:

1. In the Main Menu, highlight *Spare Drive Management* and press Enter.

   The Spare Drive Management screen displays.

2. Highlight the spare drive you want to delete and press the spacebar to mark the spare drive.

   An asterisk (*) appears at the left of the selected spare drive.

3. Highlight *Delete Selected Spare Drives* and press Enter.

4. Press Y to confirm spare drive deletion.

   The selected spare drive is removed from the list.

Background Activity

The Background Activity function enables you to monitor background activities are running on the SuperTrak RAID controller. Information reported includes:

- **Device** – Disk array or logical drive by ID number
- **Type** – Synchronization, Initialization, or Rebuilding
- **Status** – Running or queued (waiting)
- **Percentage** – Percent completed

The Background Activity screen does not enable you to start, pause, resume, or cancel any activity. Status of the activity, such as in-progress or paused.

To view background activity, in the Main Menu, highlight *Spare Drive Management* and press Enter.

When you are done, highlight *Return to Previous Menu* and press Enter

Event Log

The event log tracks events related to the SuperTrak controller and includes the following functions:

- Viewing RAM Events (page 77)
- Viewing NVRAM Events (page 77)
- Clearing the Event Logs (page 78)

Viewing RAM Events

RAM events are also called Runtime events. All recorded events happened since the last time you booted the Host PC. Displays the 1023 most recent events.

To view NVRAM events:

1. In the Main Menu, highlight *Event Log* and press Enter.

   The Event Log screen displays.
2. Optional. If NVRAM is displayed beside Select Location, highlight *Select Location* and press Enter. Then highlight *NVRAM* and press Enter.
3. Do the following actions to navigate the Event Log screen:
   - To move to the next page or screen of events, highlight *Next Page* and press Enter.
   - To move to the previous page or screen of events, highlight *Previous Page* and press Enter.
   - To see all the information about an event, highlight the event and press Enter.

Viewing NVRAM Events

NVRAM events ar the most important events. These events are stored in non-volatile RAM. Displays the 63 most recent events.

To view NVRAM events:

1. In the Main Menu, highlight *Event Log* and press Enter.

   The Event Log screen displays.
2. Optional. If RAM is displayed beside Select Location, highlight *Select Location* and press Enter. Then highlight *NVRAM* and press Enter.
3. Do the following actions to navigate the Event Log screen:
   - To move to the next page or screen of events, highlight *Next Page* and press Enter.
   - To move to the previous page or screen of events, highlight *Previous Page* and press Enter.

- To see all the information about an event, highlight the event and press Enter.

Clearing the Event Logs

Clearing the event logs remove all of the events from both the RAM and NVRAM event logs. Note that the RAM log clears every time you boot the Host PC.

1. In the Main Menu, highlight *Event Log* and press Enter.

   The Event Log screen displays. You can clear both logs from the RAM or NVRAM screen.
2. Highlight *Clear All Event Logs* and press Enter.
3. Press Y to confirm event log clearing.

Time Sync

The Time Sync function adds two special features to SuperTrak. These functions include:

- Setting the Time Zone (page 79)
- Synchronizing Time with an Embedded Site (page 79)

The Time Sync function does not replace or overwrite the regular date and time settings in the Host PC's BIOS or OS.

Setting the Time Zone

To set the difference between the current time zone (the time zone in which you are) and Greenwich Mean Time (GMT):

1. In the Main Menu, highlight *Time Sync* and press Enter.

   The Time Sync screen displays.

2. Highlight *Current Time Zone* and press the **+** or **–** key to change the time for the current time zone.

   Each press of the + key increments 15 minutes forward.
   Each press of the – key increments 15 minutes backward.

Synchronizing Time with an Embedded Site

This feature requires you to have installed in the Host PC a separate product that is not part of SuperTrak RAID controller.

To synchronize time with an embedded site:

1. In the Main Menu, highlight *Time Sync* and press Enter.

   The Time Sync screen displays.

2. Highlight *Sync Time with Embedded Site* and press Enter.

Miscellaneous

The Miscellaneous menu enables three useful functions on SuperTrak:

- SAS Ready LEDs (page 80)
- SGPIO Backplane (page 80)
- Buzzer (page 80)

SAS Ready LEDs

The LEDs for SAS disk drives stay on continuously to show Ready status, except when the drive is processing a command. This function enables you to turn the LEDs off.

To turn the SAS drive LEDs off:

1. In the Main Menu, highlight *Miscellaneous* and press Enter.
2. Highlight *SAS READY LED* and press Enter.
3. Highlight your choice and press Enter.
    - On – SAS drive LEDs on continuously
    - Off – SAS drive LEDs off

SGPIO Backplane

This function enables you to set your SuperTrak card to work your enclosure management controller through the SGPIO connection.

To choose your enclosure management controller setting:

1. In the Main Menu, highlight *Miscellaneous* and press Enter.
2. Highlight *SGPIO Backplane* and press Enter.
3. Highlight your choice and press Enter.
    - Generic
    - Chenbro
    - AIC
    - AMI MG9073S

Buzzer

The buzzer sounds to inform you that your RAID system needs attention. But the buzzer does not specify the condition. When a continuous tone sounds, there are multiple alarm patterns sounding at the same time.

When the buzzer sounds, take the following actions:

- Check your disk arrays and logical drives.
- Check the Event Log.

To silence the buzzer for the current trigger event, you must disable it.

Also see “Managing Physical Drive Problems” on page 60 and “Managing Logical Drive Problems” on page 68.

Enabling or Disabling the Buzzer

To enable or disable the Buzzer:

1. In the Main Menu, highlight *Miscellaneous* and press Enter.
2. Highlight *Buzzer* and press Enter.
3. Highlight your choice and press Enter.
    - Enable
    - Disable

Chapter 5: Management with WebPAM PRO

- Logging into WebPAM PRO (page 83)
- Accessing the Interface (page 86)
- Managing Users (page 92)
- .Working with Subsystem/Host Management (page 96)
- Managing Software Services (page 99)
- Managing the Host (page 103)
- Managing the Subsystem (page 104)
- Managing the Controller (page 115)
- Managing Enclosures (page 121)
- Managing Physical Drives (page 122)
- Managing Disk Arrays (page 127)
- Managing Logical Drives (page 143)
- Managing Spare Drives (page 149)
- Working with the Logical Drive Summary (page 153)

This chapter describes using WebPAM PRO to monitor and manage your RAID system. This chapter is divided into sections for major WebPAM PRO components as shown above.

Logging into WebPAM PRO

You can log into WebPAM PRO in either of two ways:

- Logging in at the Host PC (page 83)
- Logging in over the Network (page 83)

Logging in at the Host PC

At the Host PC (where the SuperTrak EX Controller is installed), to log into WebPAM PRO, do one of the following actions:

- Double-click the WebPAM PRO desktop icon.
- Choose *WebPAM PRO* in the Windows Programs menu or the Linux Applications menu.
- Follow the steps under “Logging in over the Network”.

Logging in over the Network

You can log into WebPAM PRO from any PC with a network connection to the Host PC (where the SuperTrak EX Controller is installed).

1. Launch your Browser.
2. In the Browser address field, type the information provided below. Then press Enter.

   If you chose External SSL Security during installation (Windows, see page 26; Linux, see page 34), use the *Secure Connection*. Otherwise, use the *Regular Connection*.

Regular Connection

- WebPAM PRO uses an HTTP connection. . . . . .http://
- Enter the Host PC's IP address. 192.168.10.228
- Enter the Port number . . . . . :8080
- Add promise to launch WebPAM PRO . . . . . /promise

Together, your entry looks like this:

http://192.168.10.228:8080/promise

Secure Connection

- WebPAM PRO uses a secure HTTP connection. . . . . .https://
- Enter the Host PC's IP address. 192.168.10.228
- Enter the Port number . . . . . :8443
- Add promise to launch WebPAM PRO . . . . . /promise

Together, your entry looks like this:

https://192.168.10.228:8443/promise

Notes

- You can enter the Host PC's network name in place of the IP address.
- If you are logging in at the Host PC, you can enter **localhost** in place of the IP address.
- Whether you select a regular or a secure connection, your login to WebPAM PRO and your user password are always secure.

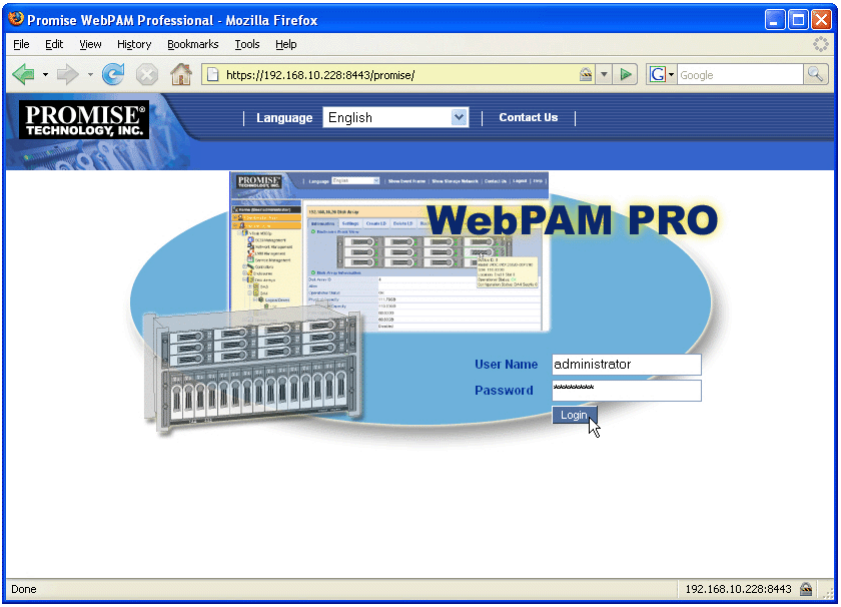
Login Screen

When the opening screen appears:

1. Type **administrator** in the User Name field.
2. Type **password** in the Password field.
3. Click the **Login** button.

   The User Name and Password are case sensitive. See Figure 1.

Figure 1. The WebPAM PRO login screen

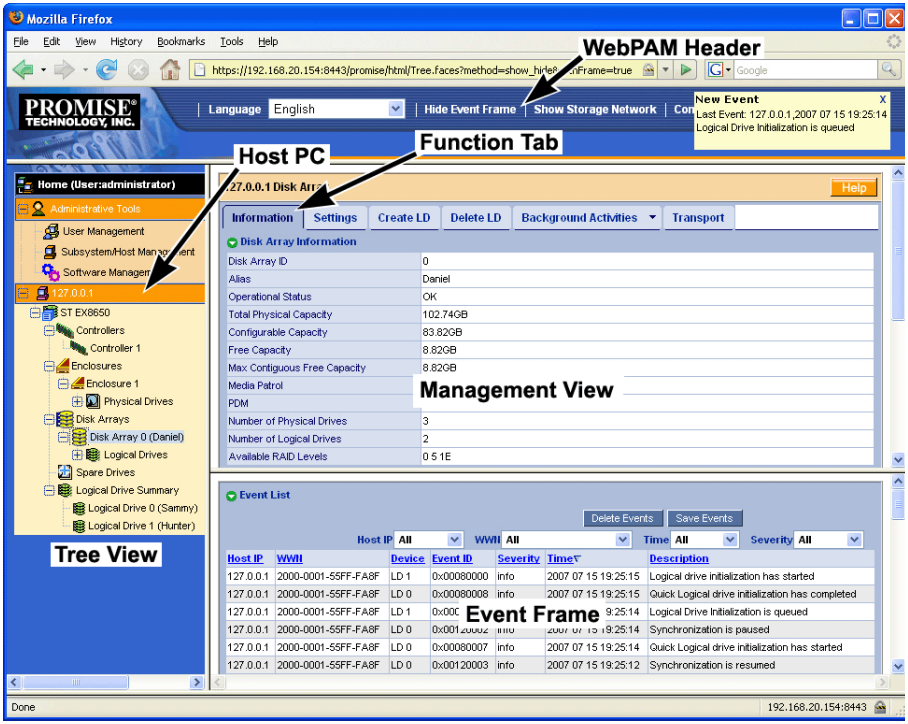


Accessing the Interface

WebPAM PRO is browser-based RAID management software with a graphic user interface. Basic user interface components and functions include:

- Using the Header (page 87)
- Using Tree View (page 87)
- Using Management View (page 88)
- Choosing a Display Language (page 89)
- Viewing the Event Frame (page 89)
- Saving the Event Frame (page 90)
- Deleting the Event Frame (page 90)
- Viewing the Storage Network (page 90)
- Logging out of WebPAM PRO (page 91)

Figure 2. WebPAM PRO interface


WebPAM Header
Function Tab
Host PC
Management View
Event Frame
Tree View
Mozilla Firefox
PROMISE TECHNOLOGY, INC.
Language
English
Hide Event Frame
Show Storage Network
New Event
Last Event: 127.0.0.1,2007 07 15 19:25:14
Logical Drive Initialization is queued
Home (User:administrator)
Administrative Tools
User Management
Software Manager
127.0.0.1
ST EX8650
Controllers
Controller 1
Enclosures
Enclosure 1
Physical Drives
Disk Arrays
Disk Array 0 (Daniel)
Logical Drives
Spare Drives
Logical Drive Summary
Logical Drive 0 (Sammy)
Logical Drive 1 (Hunter)
Help
Information
Settings
Create LD
Delete LD
Background Activities
Transport
Disk Array Information
Disk Array ID 0
Alias Daniel
Operational Status OK
Total Physical Capacity 102.74GB
Configurable Capacity 83.82GB
Free Capacity 8.82GB
Max Contiguous Free Capacity 8.82GB
Media Patrol
PDM
Number of Physical Drives 3
Number of Logical Drives 2
Available RAID Levels 0 5 1E
Event List
Delete Events
Save Events
Host IP
WWN
Time
Severity
Host IP | WWN | Device | Event ID | Severity | Time | Description
127.0.0.1 | 2000-0001-55FF-FA8F | LD 1 | 0x00080000 | info | 2007 07 15 19:25:15 | Logical drive initialization has started
127.0.0.1 | 2000-0001-55FF-FA8F | LD 0 | 0x00080008 | info | 2007 07 15 19:25:15 | Quick Logical drive initialization has completed
127.0.0.1 | 2000-0001-55FF-FA8F | LD 1 | 0x000 | | 9:25:14 | Logical Drive Initialization is queued
127.0.0.1 | 2000-0001-55FF-FA8F | LD 0 | 0x0012 | | 9:25:14 | Synchronization is paused
127.0.0.1 | 2000-0001-55FF-FA8F | LD 0 | 0x00080007 | info | 2007 07 15 19:25:14 | Quick Logical drive initialization has started
127.0.0.1 | 2000-0001-55FF-FA8F | LD 0 | 0x00120003 | info | 2007 07 15 19:25:12 | Synchronization is resumed
Done
192.168.20.154:8443

There are four major parts to the WebPAM PRO interface:

- Header (see page 87)
- Tree View (see page 87)
- Management View (see page 88)
- Event Frame (see page 89)

Using the Header

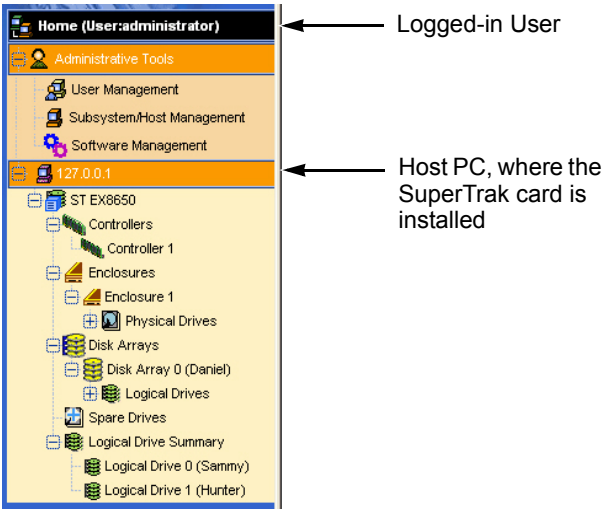
The Header contains the following items:

- **Language** – To choose a display language, see “Choosing a Display Language” on page 89.
- **Show/Hide Event Frame** – To view the Event Frame, see “Viewing the Event Frame” on page 89.
- **Show/Hide Storage Network** – To view the Storage Network, see “Viewing the Storage Network” on page 90.
- **Contact Us** – Click here for Promise Technology contact information. Or see “Contacting Technical Support” on page 197.
- **Logout** – To logout, see “Logging out of WebPAM PRO” on page 91.

Using Tree View

Tree View enables you to navigate around all components of the Host PC (where the SuperTrak controller card is installed), software management, RAID controller, enclosure, physical drives, disk arrays, logical drives, and spare drives. The figure below shows the components of Tree View.

Figure 3. WebPAM PRO Tree View



The Administrative Tools section is different for the Administrator and Super Users than for other users. The remainder of the Tree is the same for all users.

Management View displays information according to the item you choose in Tree View.

Using Management View

Management View—also referred to Management View—provides the actual user interface with the SuperTrak EX Controller card, including creation, maintenance, deletion, and monitoring of disk arrays and logical drives.

Function Tabs control specific actions and processes. This View changes depending on which item you choose in Tree View and which tab you choose in the Management View itself.

Click the **Help** button to the right of the tabs in Management View to access online help for the function that is currently displayed.

Choosing a Display Language

WebPAM PRO displays in the following languages:

- English
- Simplified Chinese
- Traditional Chinese
- French
- German
- Italian
- Japanese
- Korean
- Spanish
- Russian

To change the display language:

1. Click the Language dropdown menu in the Header.
2. Highlight the language you prefer.
   WebPAM PRO displays in the chosen language.

Viewing the Event Frame

To view the Event Frame, click **Show Event Frame** in the Header.

To hide the Event Frame, click **Hide Event Frame** in the Header.

The Event Frame reports all events and stores them in the WebPAM PRO folder on the hard disk drive of the Host PC.

In the event frame, events are listed and sorted by:

- **Host IP** – The IP address of the Host PC or subsystem where the event happened
- **WWN** – World Wide Number of the Host PC or subsystem where the event happened
- **Device** – Disk array, logical drive, physical drive, controller, battery, etc.
- **Event ID** – The hexadecimal number that identifies the specific type of event
- **Severity** – See below:
  - **Information** – Information only, no action is required
  - **Warning** – User can decide whether or not action is required
  - **Minor** – Action is needed but the condition is not serious at this time
  - **Major** – Action is needed now
  - **Critical** – Action is needed now and the implications of the condition are serious
  - **Fatal** – Non-Recoverable error or failure has occurred
- **Time** – Time and date of the occurrence
- **Description** – A brief description of the event

You can also view events by clicking the Subsystems icon in Tree View, then clicking the **Event** tab in Management View.

Saving the Event Frame

This function saves a copy of the events from the Event Frame as a text file on the Host PC's hard drive.

To save the event log:

1. In the Header, click **Show Event Frame**.
2. In the Event Frame, click the **Save Events** button.
3. In the File Download dialog box, click the **Save** button.
4. In the Save dialog box, name the file, navigate to the folder where you want to save the log file, and click the **Save** button.

   The event log is saved as a text file on the Host PC's hard drive.

Deleting the Event Frame

This function deletes the events from the Event Frame and from the WebPAM PRO database.

This function has no effect upon events reported under the Subsystem icon Events tab. See "Viewing the Runtime Event Log" on page 106 and "Viewing the NVRAM Event Log" on page 107.

To clear the event log:

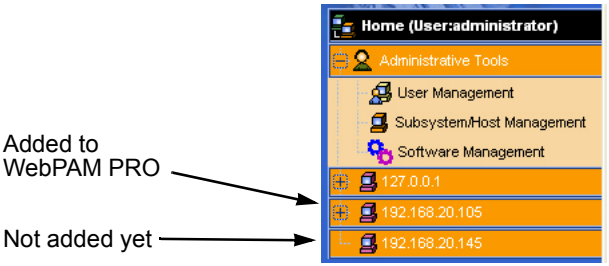
1. In the Header, click **Show Event Frame**.
2. In the Event Frame, click the **Delete Events** button.
3. In the Confirmation dialog box, type **confirm** and click the **OK** button.

Viewing the Storage Network

The Storage Network consists of all the subsystems and host PCs currently accessible on your network. Use this function to identify the subsystem or host PC you want to add.

Subsystems and host PCs already added to WebPAM PRO have a **+** icon beside them in Tree View.

Figure 4. The Storage Network appears in Tree View



To view the Storage Network, click **Show Storage Network** in the Header. All networked systems will appear in Tree View.

To hide the Storage Network, click **Hide Storage Network** in the Header. Only the networked systems you have added appear in Tree View.

See “Adding a Subsystem or Host” on page 96.

Logging out of WebPAM PRO

There are two ways to log out of WebPAM PRO:

- Close your browser window
- Click **Logout** in the WebPAM PRO Header

Figure 5. Clicking “Logout” in the Header)

Clicking **Logout** brings you back to the Login Screen. After logging out, you must enter your user name and password in order to log in again.

Managing Users

User Management includes all functions dealing with user accounts. Functions include:

- Viewing User Information (page 92)
- Making User Settings (page 92)
- Making Your Own User Settings (page 93)
- Changing a User's Password (page 93)
- Changing Your Own Password (page 93)
- Creating a User (page 94)
- Deleting a User (page 94)

Viewing User Information

The view a list of users, their status, access privileges, display name, and email address:

1. Click the Administrative Tools icon.
2. Click the User Management icon.

   The Information tab appears in Management View.

Making User Settings

To change settings of other users:

1. Log into WebPAM PRO as the Administrator or a Super User.
2. Click the Administrative Tools icon.
3. Click the User Management icon.
4. Click the **Information** tab in Management View.
5. In the list of users, click the **link** of the user whose settings you want to change.

   The Settings screen for the chosen user displays.
6. Enter or change the settings for this user.
   - Enable/disable this user
   - Display name
   - Privilege. See "List of User Privileges" on page 94
7. Click the **Submit** button.

The Administrator or Super User can change another user's password. See "Changing a User's Password" on page 93 for more information.

You can also set user privilege under Subsystem/Host Management. See “Setting User Privilege” on page 97 and “Setting User Rights” on page 103.

Making Your Own User Settings

To change your own user settings:

1. Log into WebPAM PRO under your own user name.
2. Click the Administrative Tools icon.
3. Click the User Management icon.
4. Click the **Settings** tab in Management View.
5. Enter or change the display name or mail address.
6. Click the **Submit** button.

Changing a User’s Password

To change a user’s password:

1. Log into WebPAM PRO as the Administrator or a Super User.
2. Click the Administrative Tools icon.
3. Click the User Management icon.
4. In the list of users, click the link of the user whose settings you want to change.

   The Settings screen for the chosen user displays.
5. Click the **Password** tab in Management View.
6. Enter the new password in the New Password field.
7. Enter the new password in the Retype Password field.
8. Click the **Submit** button.

Changing Your Own Password

To set or change your own password:

1. Log into WebPAM PRO under your own user name.
2. Click the Administrative Tools icon.
3. Click the User Management icon.
4. Click the **Password** tab in Management View.
5. Enter the current password in the Old Password field.

   If you do not have a password, leave this field blank.
6. Enter the new password in the New Password field.
7. Enter the new password in the Retype Password field.

8. Click the **Submit** button.

Creating a User

To create a user:

1. Log into WebPAM PRO as the Administrator or a Super User.
2. Click the Administrative Tools icon.
3. Click the User Management icon.
4. Click the **Create** tab in Management View.
5. Enter a user name in the User Name field.
6. Enter a password for this user in the New Password and Retype Password fields.

   A password is optional. If you do not assign password, tell this user to leave the password field blank when he/she logs into to WebPAM PRO. Users can set their own passwords, see “Changing Your Own Password” on page 93.
7. Check the Enabled box to enable this user on this subsystem.
8. Enter a display name in the Display Name field.

   A display name is optional but recommended.
9. Choose a privilege level from the Privilege dropdown menu.

   For definitions of each privilege level, see the List of User Privileges below.
10. Click the **Submit** button.

List of User Privileges

- **View** – Allows the user to see all status and settings but not to make any changes
- **Maintenance** – Allows the user to perform maintenance tasks including Rebuilding, PDM, Media Patrol, and Redundancy Check.
- **Power** – Allows the user to create (but not delete) disk arrays and logical drives, change RAID levels, change stripe size; change settings of components such as disk arrays, logical drives, physical drives, and the controller.
- **Super** – Allows the user full access to all functions including create and delete users and changing the settings of other users, and delete disk arrays and logical drives. The default “administrator” account is a Super User.

Deleting a User

There will always be at least one Super User account. You cannot delete the user account you used to log in. To delete a user:

1. Log into WebPAM PRO as the Administrator or a Super User.

2. Click the Administrative Tools icon.
3. Click the User Management icon.
4. Click the **Delete** tab in Management View.
5. Check the box to the left of the user you want to delete.
6. Click the **Submit** button.
7. Click **OK** in the confirmation box.

Working with Subsystem/Host Management

Subsystem/Host Management includes the following functions:

- Viewing Subsystem/Host Information (page 96)
- Adding a Subsystem or Host (page 96)
- Deleting a Subsystem or Host (page 97)
- Setting User Privilege (page 97)

Viewing Subsystem/Host Information

To view the Subsystem/Host List:

1. Click the Administrative Tools icon in Tree View.
2. Click the Subsystem/Host Management icon.

   In the Information tab, the following information appears:

   - Subsystem/Host IP address
   - Management Port IP address
   - Health – A green checkmark means OK. A red X indicates a problem
   - Model of the RAID controller
   - Alias of the RAID controller
   - Firmware Version of the RAID controller
   - Interface of the RAID controller
   - World Wide Number of the RAID controller

   If a red X appears under Health, click the Health Information icon to display a breakdown showing the health of the controller, disk arrays, logical drives, spare drives, and physical drives.

Adding a Subsystem or Host

To add a subsystem/ or host PC to WebPAM PRO:

1. Log into WebPAM PRO as the Administrator or a Super User.
2. Click the Administrative Tools icon in Tree View.
3. Click the Subsystem/Host Management icon.
4. Click the **Add Subsystem/Host** tab in Management View.
5. Do one of the following actions:

   - To create an in-band connection: Type the *Host PC's* IP address into the address field.

     Choose this option for SuperTrak. Note that entries such as *localhost* or the Host PC's network name do not work for this function.

- To create an out-of-band connection: Type the *Subsystem's* management port IP address into the address field.

6. Click the **Submit** button.

   The new Subsystem or Host PC is added to Tree View.

In-Band versus Out-of-Band

In-band connection means the WebPAM PRO Agent is running on the Host PC or server. Management commands to a subsystem travel through the subsystem's *data* ports. With an in-band connection, you can have multiple subsystems under the same Host PC or server.

Out-of-band connection means the WebPAM PRO Agent is running on the subsystem. Management commands to a subsystem travel through the subsystem's *management* port.

Deleting a Subsystem or Host

When you delete a subsystem or host PC, you only remove it from WebPAM PRO's list of monitored systems. This action has no effect upon the disk arrays, logical drives, or data stored on the RAID.

To delete a subsystem or host PC:

1. Log into WebPAM PRO as the Administrator or a Super User.
2. Click the Administrative Tools icon in Tree View.
3. Click the Subsystem/Host Management icon.
4. Click the **Delete Subsystem/Host** tab in Management View.
5. Check the box to the left of the subsystem or host PC you want to delete.
6. Click the **Submit** button.
7. In the confirmation box, type the word **confirm** in the field provided.
8. Click the **OK** button.

Setting User Privilege

To set user privilege:

1. Click the Administrative Tools icon in Tree View.
2. Click the Subsystem/Host Management icon.
3. click the IP address link of the Subsystem or Host you want to access.
4. Beside the name of the user whose privilege you want to change, choose the privilege level from the Privilege dropdown menu.

   For definitions of each privilege level, see "List of User Privileges" on page 94.

5. Click the **Submit** button.

You can also set user privilege under User settings. See “Making User Settings” on page 92.

Managing Software Services

Software Services include the following functions:

- Viewing Service Status (page 99)
- Changing Web Server Settings (page 99)
- Restarting the Tomcat Server (page 100)
- Setting up Email Service (page 100)
- Setting up Extended SMTP (page 101)
- Setting Event Frame Refresh Time (page 101)
- Changing CIM Client Settings (page 102)
- Changing CIM Server Settings (page 102)

Viewing Service Status

There are two software services: Web Server and Email. There are no user settings. To view the status of the software services:

1. Click the Administrative Tools icon in Tree View.
2. Click the Software Management icon.

   The service name, startup type, and current status appear under the Service tab.

Changing Web Server Settings

To change the Web Server settings:

1. Click the Administrative Tools icon in Tree View.
2. Click the Software Management icon.
3. Click the **Web Server** tab in Management View.
4. Do one of the following actions:
   - For a regular connection:

     In the HTTP Port field, type the HTTP port number. The default is 8080.
   - For a secure connection:

     Check the Enable SSL box.

     In the HTTPS Port field, type the HTTPS port number. The default is 8443.
5. In the Session Time Out field, enter a time value in minutes.

   The range is 1 to 1440 minutes. 15 minutes is the default.

Session Time Out refers to the amount of time the connection remains active without any user interaction. After WebPAM PRO reaches the Time Out interval, you must log in again and begin a new session.

6. Click the **Submit** button.
7. In the confirmation box, type the word **confirm** in the field provided.
8. Click the **OK** button.

Restarting the Tomcat Server

After you change the Web Server port number, you must restart the Tomcat server.

Windows

In the Start menu, choose Programs > WebPAM PRO > Server > Restart.

Linux

1. Open a terminal window.
2. Go to the server folder.

   cd /opt/Promise/WebPAMPRO/Server
3. Run the restart command:

   sh restartPromiseWebPamPro.sh

   The system returns:

   /etc/rc.d/init.d/ exists.
   Shutting down: tomcat OK
   Starting: tomcat OK

   (Or a similar message)

Setting up Email Service

To change the Email settings:

1. Click the Administrative Tools icon in Tree View.
2. Click the Software Management icon.
3. Click the **Email** tab in Management View.
4. Enter an Email sender address (example: RAIDmaster@mycompany.com) in the field provided.
5. Enter an Email server IP address in the field provided.
6. Enter an Email subject (example: VTrak Status) in the field provided.
7. When you are done, click the **Submit** button.

Setting up Extended SMTP

To make Extended SMTP settings:

1. Click the Administrative Tools icon in Tree View.
2. Click the Software Management icon.
3. Click the **Email** tab in Management View.
4. Check the Enable ESMTP box to enable ESMTP.
   Uncheck the box to disable ESMTP.
5. Enter ESMTP user name in the field provided.
6. Enter a ESMTP password in the field provided.
7. When you are done, click the **Submit** button.

Sending A Test Email Message

Before you can send a test message, your email service must be set up as described in “Setting up Email Service” on page 100.

To send a test email message:

1. Click the Administrative Tools icon in Tree View.
2. Click the Software Management icon.
3. Click the **Email** tab in Management View.
4. Click the **Test Email** button.
   A new window opens.
5. Type the recipient's email address in the field provided.
6. Click the **Submit** button.
   WebPAM PRO sends a test email message to the address you specified.

Setting Event Frame Refresh Time

To set the refresh time for the Event Frame:

1. Click the Administrative Tools icon in Tree View.
2. Click the Software Management icon.
3. Click the **Refresh time** tab.
4. Choose a time interval from the Event Refresh Time dropdown menu.
   The choices are *15*, *30*, *60*, and *300* seconds.
5. Click the **Submit** button.

Changing CIM Client Settings

The CIM client is part of the WebPAM PRO Utility Server. The Utility Server can be installed on any PC on the network. Only one CIM client and Utility Server installation is required.

The CIM client works with CIM server. The CIM server is part of the WebPAMPRO Agent. The Agent must be installed on every host PC where the HBA RAID controller is installed to enable management over a network.

Under most conditions, there is no need to change CIM settings.

To change settings for the CIM client:

1. Click the Administrative Tools icon in Tree View.
2. Click the Software Management icon.
3. Click the **CIM Settings** tab.
4. Type the user name in the CIM User name field.
   The default name is “cim”.
5. Type a password into the CIM User Password field.
   The default password is “password”.
6. Click the **Submit** button.

Important

If you change CIM client settings, you must make matching CIM server settings on ALL Host PCs, otherwise WebPAM PRO will be unable to monitor them.

Be sure you change the CIM server settings on ALL of your Host PCs to match the CIM client settings.

Changing CIM Server Settings

To change settings for the CIM server:

1. On the Host PC, access the WebPAM PRO agent folder.
   - **Windows** – C:/Program Files/Promise/WebPAMPRO/Agent/bin
   - **Linux** – /opt/Promise/WebPAMPRO/Agent/bin
2. Open a command-line utility, type **cimuser --help** and press Enter.
3. Follow the instructions on the screen.

Managing the Host

The Host is designated by its IP address:127.0.0.1. Host functions include:

- Viewing Host Information (page 103)
- Setting User Rights (page 103)
- Refreshing the WebPAM PRO Screen (page 103)

Viewing Host Information

To view Host information, click the 127.0.0.1 icon in Tree View. In the Information tab, the following information appears:

- Management Port IP address (refers to the Host PC)
- Model of the RAID controller
- Alias of the RAID controller
- Firmware Version of the RAID controller
- Interface of the RAID controller
- World Wide Number of the RAID controller

Setting User Rights

User rights is the same function as user privilege. To set user rights:

1. Click the 127.0.0.1 icon in Tree View.
2. Click the **User Rights** tab.
3. Beside the name of the user whose privilege you want to change, choose the privilege level from the Privilege dropdown menu.

   For definitions of each privilege level, see “List of User Privileges” on page 94.
4. Click the **Submit** button.

You can also set user privilege under User settings. See “Making User Settings” on page 92

Refreshing the WebPAM PRO Screen

Unlike clicking browser’s refresh button, this function calls new information from the RAID controller’s firmware to update the screen. To refresh the screen:

1. Click the 127.0.0.1 icon in Tree View.
2. Click he **Refresh** tab.
3. Click the **Submit** button.
4. Click the **OK** button in the confirmation box.

Managing the Subsystem

Subsystem functions include:

- Viewing Subsystem Information (page 104)
- Clearing Statistical Data (page 104)
- Setting an Alias for the Subsystem (page 105)
- Viewing the Runtime Event Log (page 106)
- Saving the Runtime Event Log (page 106)
- Clearing the Runtime Event Log (page 107)
- Viewing the NVRAM Event Log (page 107)
- Saving the NVRAM Event Log (page 108)
- Clearing the NVRAM Event Log (page 108)
- Updating the Firmware (page 105)
- Checking Subsystem Health (page 106)
- Viewing the NVRAM Event Log (page 107)
- Viewing Current Background Activities (page 108)
- Making Background Activity Settings (page 109)
- Running Background Activities (page 110)
- Running Media Patrol (page 110)
- Running PDM (page 110)
- Viewing Scheduled Activities (page 111)
- Scheduling an Activity (page 111)
- Deleting a Scheduled Activity (page 113)
- Viewing System Configuration (page 113)

Viewing Subsystem Information

To view information about a subsystem, click the Subsystem icon in Tree View. Management View displays the subsystem information.

To view information about the Host PC, users, controllers, schedules, activities, physical drives, disk arrays, and logical drives, see “Viewing System Configuration” on page 113.

Clearing Statistical Data

Use this function to clear the statistical data registers for the controller, physical drives, and logical drives.

To clear statistical data:

1. In Tree View, click the Subsystem icon.
2. In Management View, click the **Information** tab.
3. Click the **Clear Statistics** link.
4. Click the **Submit** button.
5. In the Confirmation dialog box, type **confirm** and click the **OK** button.

Setting an Alias for the Subsystem

An alias is optional. To set an alias for this subsystem or host:

1. In Tree View, click the Subsystem icon.
2. In Management View, click the **Settings** tab.
3. Enter a name into the Alias field.

   Maximum of 48 characters. Use letters, numbers, one space between words, and underscore.
4. Click the **Submit** button.

Updating the Firmware

Cautions

- Before you begin, backup any important or useful data.
- Do NOT power off your PC during the procedure.

Use this function to update the firmware and BIOS on the SuperTrak controller card. You must first download the update file and save it to the Host PC.

Note that this function does not update the software driver. Install the software driver file following the procedure for your operating system.

To upgrade the firmware and BIOS on the SuperTrak controller card:

1. In Tree View, click the Subsystem icon.
2. In Management View, click the **Firmware Update** tab dropdown menu and choose *Download From Local File*.
3. Click the **Browse** button.
4. Navigate to the directory where you saved the upgrade file, then click the upgrade file, and click the **Open** button.
5. Click the **Submit** button.

   When the Flash Image Status shows *Flash image completed*, the firmware and BIOS have been updated.
6. Restart the Host PC.

Checking Subsystem Health

1. In Tree View, click the Subsystem icon.
2. In Management View, click the **Health** tab.

   The health or status of following items is displayed:

   - Controller
   - Disk Array
   - Logical Drive
   - Spare Drive
   - Physical Drive

   If any item reports other than “OK” click that item in the Tree to investigate the cause of the problem.

Viewing the Runtime Event Log

Runtime Events lists information about all events recorded since the system was started. Runtime events are stored in RAM on the RAID controller. These events are cleared when you reboot your system.

To view runtime events:

1. In Tree View, click the Subsystem icon.
2. From the dropdown menu on the Event tab, choose *Runtime Events*.

   The events are listed from newest at the top of the list to oldest at the bottom.

Severity Definitions

Each event is marked with a level of severity.

- **Information** – Information only, no action is required
- **Warning** – User can decide whether or not action is required
- **Minor** – Action is needed but the condition is not serious at this time
- **Major** – Action is needed now
- **Critical** – Action is needed now and the implications of the condition are serious
- **Fatal** – Non-Recoverable error or failure has occurred

Saving the Runtime Event Log

This function saves a copy of the runtime event log as a text file on the Host PC’s hard drive.

To save the runtime event log:

1. In Tree View, click the Subsystem icon.
2. From the dropdown menu on the Events tab, choose *Runtime Events*.
3. At the bottom of the window, click the **Save Event Log** button.
4. In the File Download dialog box, click the **Save** button.
5. In the Save dialog box, name the file, navigate to the folder where you want to save the log file, and click the **Save** button.

   A text file of the event log is saved to the Host PC's hard drive.

Clearing the Runtime Event Log

This function clears the events from the runtime event log screen and from the RAM on the RAID controller. This function has no effect upon events reported in the WebPAM PRO Event Frame. "Viewing the Event Frame" on page 89.

To clear the runtime event log:

1. In Tree View, click the Subsystem icon.
2. From the dropdown menu on the Events tab, choose *Runtime Events*.
3. At the bottom of the window, click the **Clear Event Log** button.
4. In the Confirmation dialog box, type **confirm** and click the **OK** button.

   All events are cleared from the screen and the RAID controller's RAM.

Viewing the NVRAM Event Log

NVRAM Events lists information about the most recent important or critical events. NVRAM events are stored in non-volatile memory on the RAID controller. This information persists even if you reboot your system.

To view runtime events:

1. In Tree View, click the Subsystem icon.
2. From the dropdown menu on the Events tab, choose *Subsystem Events in NVRAM*.

   The events are listed from newest at the top of the list to oldest at the bottom.

Severity Definitions

Each event is marked with a level of severity.

- **Information** – Information only, no action is required
- **Warning** – User can decide whether or not action is required
- **Minor** – Action is needed but the condition is not serious at this time
- **Major** – Action is needed now

- **Critical** – Action is needed now and the implications of the condition are serious
- **Fatal** – Non-Recoverable error or failure has occurred

Saving the NVRAM Event Log

This function saves a copy of the NVRAM event log as a text file on the Host PC's hard drive.

To save the NVRAM event log:

1. In Tree View, click the Subsystem icon.
2. From the dropdown menu on the Events tab, choose *Subsystem Events in NVRAM*.
3. At the bottom of the window, click the **Save Event Log** button.
4. In the File Download dialog box, click the **Save** button.
5. In the Save dialog box, name the file, navigate to the folder where you want to save the log file, and click the **Save** button.

   A text file of the event log is saved to the Host PC's hard drive.

Clearing the NVRAM Event Log

This function clears the events from the NVRAM event log screen and from the NVRAM on the RAID controller. This function has no effect upon events reported in the WebPAM PRO Event Frame. "Viewing the Event Frame" on page 89.

To clear the NVRAM event log:

1. In Tree View, click the Subsystem icon.
2. From the dropdown menu on the Events tab, choose *System Events in NVRAM*.
3. At the bottom of the window, click the **Clear Event Log** button.
4. In the Confirmation dialog box, type **confirm** and click the **OK** button.

   All events are cleared from the screen and the RAID controller's non-volatile RAM.

Viewing Current Background Activities

To view the current background activities:

1. Click the Subsystem icon in Tree View.
2. Click the **Background Activities** tab in Management View.

   A list of current background activities appears, including:

   - Rebuild

- PDM – Predictive Data Migration
- Synchronization
- Redundancy Check
- Migration
- Transition
- Initialization
- Media Patrol

Making Background Activity Settings

To make settings for background activities:

1. In Tree View, click the Subsystem icon.
2. From the dropdown menu on the Background Activities tab, choose *Settings*.
3. Click the dropdown menu to choose a priority of *Low*, *Medium*, or *High* for the following functions:
   - **Rebuild** – Rebuilds the data from a failed drive in a disk array
   - **Synchronization** – Checks the data integrity on disk arrays
   - **Initialization** – Sets all data bits in the logical drive to zero
   - **Redundancy Check** – Checks, reports and can correct data inconsistencies in logical drives
   - **Migration** – Change RAID level or add physical dries to disk arrays
   - **PDM** – Looks for bad blocks the physical drives of disk arrays
   - **Transition** – Returns a revertible spare drive to spare status

   The rates are defined as follows:
   - **Low** – Fewer resources to activity, more to data read/write.
   - **Medium** – Balance of resources to activity and data read/write.
   - **High** – More resources to activity, fewer to data read/write.
4. Highlight the following PDM trigger settings and type a value into the corresponding field:
   - **Reassigned Block Threshold** – 1 to 512 blocks
   - **Error Block Threshold** – 1 to 1024 blocks
5. Check to enable or uncheck to disable the following functions:
   - **Media Patrol** – Checks the magnetic media on physical drives
   - **Auto Rebuild** – If there is a spare drive of adequate capacity, a critical disk array will begin to rebuild automatically. If not spare drive is available, the disk array will begin to rebuild as soon as you replace the

failed physical drive with an unconfigured physical drive of equal or greater size.

6. Click the **Submit** button to save your settings.

Running Background Activities

To run a background activity from the Background Activities tab:

1. In Tree View, click the Subsystem icon.
2. From the dropdown menu on the **Background Activities** tab, choose one of the following activities:
   - **Media Patrol** – See “Running Media Patrol” on page 110
   - **Rebuild** – See “Rebuilding a Disk Array” on page 139
   - **PDM** – See “Running PDM” on page 110
   - **Transition** – See “Transitioning a Disk Array” on page 141
   - **Initialization** – See “Initializing a Logical Drive” on page 146
   - **Redundancy Check** – See “Running Redundancy Check” on page 147
3. In the next screen, make the choices as requested.
4. Click the **Start** button.

Running Media Patrol

Media Patrol checks the magnetic media on physical drives. When it finds the specified number of bad blocks, it will trigger PDM. See “Making Background Activity Settings” on page 109 and “Running PDM” on page 110.

You can schedule Media Patrol to run automatically, see “Scheduling an Activity” on page 111.

To run Media Patrol:

1. In Tree View, click the Subsystem icon.
2. From the dropdown menu on the Background Activities tab, choose *Start Media Patrol*.
3. In the next screen, click the **Start** button.

Running PDM

Predictive Data Migration (PDM) migrates data from the suspect physical drive to a spare disk drive, similar to Rebuilding. But unlike Rebuilding, PDM acts *before* the disk drive fails and your Logical Drive goes Critical.

You an also run PDM on a specific disk array, see “Running PDM on a Disk Array” on page 140.

Also see “Predictive Data Migration (PDM)” on page 184.

To run PDM:

1. In Tree View, click the Subsystem icon.
2. From the dropdown menu on the Background Activities tab, choose *Start PDM*.
3. In the next screen, choose the *Source* and *Target* physical drives.

   The suspect physical drive is the Source. The replacement physical drive is the Target.
4. Click the **Start** button.

Viewing Scheduled Activities

To view scheduled activities for this subsystem:

1. Click the Subsystem icon Tree View.
2. Click the **Scheduler** tab in Management View.

Scheduling an Activity

To set a scheduled activity for this subsystem:

1. Click the Subsystem icon Tree View.
2. From the dropdown menu on the Scheduler tab, choose *Add BGA Scheduler*.
3. Click the option button of the activity you want:
   - Media Patrol. See “Running Media Patrol” on page 110
   - Redundancy Check. See “Running Redundancy Check” on page 147
   - Spare Check. See “Running Spare Check” on page 152
4. In the Scheduler dialog box, check the *Enable This Schedule* box.

5. Click the option button for the Recurrence Pattern you want:
   - Daily
   - Weekly
   - Monthly
6. Click the **Next** button.
7. For a DAILY recurrence pattern, make the following setting:
   - Choose a Start Time for the activity, based on a 24-hour clock, from the dropdown menus.
   - Type the number of days between activities, from 1 to 255, into the Every days field.

   For a WEEKLY recurrence pattern, make the following settings:
   - Choose a Start Time for the activity, based on a 24-hour clock, from the dropdown menus.
   - Type the number of weeks between activities, from 1 to 52, into the Every weeks field.
   - Check the boxes for the days of the week you want the activity to run.

     You can choose from 1 to 7 days.

   For a MONTHLY recurrence pattern, make the following settings:
   - Choose a Start Time for the activity, based on a 24-hour clock, from the dropdown menus.
   - Choose the day of the month:
     - Choose a day of the month, 1 to 31, from the dropdown menu. See the Note below.
     - Choose a day of the month, first to last, and day of the week, from the dropdown menus.
   - Check the boxes for the months of the year you want the activity to run.

     You can choose from 1 to 12 months.
8. Choose a starting date in the Start From dropdown menus.

   The default is today's date.
9. Choose an End On option:
   - No end date (recommended).
   - End After the specified number of activities. Type the number of activities, from 1 to 255, into the field provided.
   - Until a specified date. Choose an end date from the dropdown menus.

     The default is today's date.

10. For Redundancy Check only:
    - Choose the Auto Fix option. This feature attempts to repair the problem when it finds an error.
    - Choose the Pause on Error option. This feature stops the process when it finds an error
    - Check the boxes beside the logical drives (all except RAID 0) to which this activity will apply.

      Note: Each logical drive can have only one scheduled Redundancy Check.
11. Click the **Submit** button.

Note

For monthly schedules, if you choose a higher number than a month has days, the activity will occur in the following month. For example, say you choose day 31. But there are only 30 days in the month of June. Therefore, the June activity will happen on July 1. The next activity will happen on July 31.

Deleting a Scheduled Activity

To delete a scheduled activity for this subsystem:

1. Click the Subsystem icon Tree View.
2. From the dropdown menu on the Scheduler tab, choose *Delete Schedules*.
3. Check the box to the left of the schedule you want to delete.
4. Click the **Submit** button.

Viewing System Configuration

To view the configuration of your complete system:

1. Click the Subsystem icon Tree View.
2. Click the **Configuration** tab in Management View.

   The following information is displayed:
   - **Host Information** – WebPAM PRO version, host name and IP address, OS version, and JVM version
   - **User List** – User name, status, and display name
   - **Controllers Summary** – Alias, model, and operational status
   - **Scheduled Activities List** – Type, recurrence, start time, and operational status
   - **Enclosures Summary** – ID, type, operational status, and description

- **Physical Drive List** – Device number, model, type, capacity, location, operational status, and configuration
- **Disk Array List** – ID, alias, operational status, configurable capacity, and free capacity
- **Logical Drive List** – Device number, alias, RAID level, capacity, ID, stripe size, sector size, and operational status
- **Spare Drive List** – ID, operational status, physical drive ID, capacity, revertibility, type (global or dedicated), and dedicated to array

Managing the Controller

The RAID controller is the heart of the RAID storage system. Management of Controllers includes the following functions:

- Viewing Controllers Information (page 115)
- Viewing Controller Information (page 115)
- Viewing Controller Statistics (page 117)
- Making Controller Settings (page 117)
- Clearing an Orphan Watermark (page 118)
- Viewing Battery Information (page 118)
- Silencing the Buzzer (page 119)
- Making Buzzer Settings (page 119)
- Testing the Buzzer (page 119)
- Viewing Buzzer Information (page 120)

Viewing Controllers Information

Controllers information refers to a brief summary about the controller. To view Controller information:

1. Click the Subsystem icon in Tree View.
2. Click the Controllers icon.

   The controllers information appears under the Information tab in Management View. Controllers information includes:

   - Controller ID
   - Alias, if assigned
   - Model of the RAID controller
   - Status of the RAID controller – OK means normal

Viewing Controller Information

Controller information refers to detailed information about the controller. To view Controller information:

1. Click the Subsystem icon in Tree View.
2. Click the Controllers icon.
3. Click the Controller icon.

   The controller information appears on the Information tab in Management View.

Controller information includes:

- Controller ID (1 or 2)
- Alias, if assigned*
- Vendor
- Model
- Operational Status
- Power On Time
- Cache Usage (percent)
- Dirty Cache Usage (percent) – Refers to data in the cache that is not yet saved to a physical drive
- Part number
- Serial number
- Hardware revision number
- WWN – World Wide Number of the controller
- Manufacturing Date
- SCSI protocols supported
- Host Driver Version
- BIOS Version
- Single Image Version
- Single Image Build Date
- The Host driver is installed and updated through your operating system. You can update the other items automatically. See “Updating the Firmware” on page 105.
- Advanced controller information includes:
- Memory Type – Controller’s data cache.
- Memory Size
- Flash Type – Stores firmware, software and user configurations.
- Flash Size
- NVRAM Type – Stores parameters, settings and tables.
- NVRAM Size
- Preferred Cache Line Size
- Cache Line Size
- Coercion*
- Coercion Method*
- SMART* – Self-Monitoring, Analysis and Reporting System for physical drives

Controller information, continued:

- SMART Polling Interval*
- Write Back Cache Flush Interval*
- Write Through Mode
- Enclosure Polling interval*
- Adaptive Writeback Cache*

Items marked with an asterisk (*) are user adjustable. See “Making Controller Settings” on page 117.

Viewing Controller Statistics

To view controller statistics:

1. Click the Subsystem icon in Tree View.
2. Click the Controllers icon.
3. Click the Controller icon.
4. From the dropdown menu on the Information tab, choose *Statistics*.

Making Controller Settings

To make Controller settings:

1. Click the Subsystem icon in Tree View.
2. Click the Controllers icon.
3. Click the Controller icon.
4. Click the **Settings** tab in Management View.
5. Make the following settings as needed:
   - Optional. Enter a name into the Alias field.

     Maximum of 48 characters. Use letters, numbers, one space between words, and underscore. An alias is not required.
   - Check the SMART Log box to enable the Self-Monitoring, Analysis, and Reporting System (SMART).
   - Enter a polling interval (1 to 1440 minutes) in SMART Polling Interval field.
   - Check the Coercion Enabled box to enable disk drive capacity coercion.

- Choose a coercion method from the Coercion Method dropdown menu. The choices are:
  - *GBTruncate*
  - *10GBTruncate*
  - *GRPRounding*
  - *TableRounding*

  For more information, see “Capacity Coercion” on page 174.
- Enter a time interval (1 to 12 seconds) in the Write Back Cache Flush Interval field.

  For more information, see “Choosing Cache Policy” on page 173.
- Enter a time interval (15 to 255 seconds) in the Enclosure Polling Interval field.

  This is the time interval in which the controller polls all of the components in the enclosure.

  Note: Adaptive Writeback Cache is a planned feature for SuperTrak.

6. Click the **Submit** button.

   The changes take effect immediately.

Clearing an Orphan Watermark

An Orphan Watermark condition is the result of a disk drive failure during an NVRAM RAID level migration on a disk array. The Clear tab remains grayed out unless this condition is present.

To clear an orphan watermark:

1. Click the Subsystem icon in Tree View.
2. Click the Controllers icon.
3. Click the Controller icon.
4. Click the **Clear** tab in Management View.
5. Click the **Submit** button.

   The change takes effect immediately.

Viewing Battery Information

The RAID controller’s cache backup battery protects data in the cache for up to 72 hours in the event of a power failure.

To view battery information:

1. Click the Subsystem icon in Tree View.
2. Click the Controllers icon.

3. Click the Controller icon.
4. Click the **Battery** tab in Management View.

In normal operation, the operational status of the battery shows Fully Charged with a Reserve Capacity of 100%. If the battery is constantly recharging, its reserve capacity drops significantly, or the battery remains discharged, replace the battery. Also see “Viewing Enclosure Information” on page 121.

Silencing the Buzzer

To silence the buzzer for the current event:

1. Click the Subsystem icon in Tree View.
2. Click the Controllers icon.
3. Click the Controller icon.
4. Click the **Buzzer** tab in Management View.
5. Click the **Mute** button.

   The buzzer goes silent but will sound again for future events.

Making Buzzer Settings

To make buzzer settings:

1. Click the Subsystem icon in Tree View.
2. Click the Controllers icon.
3. Click the Controller icon.
4. From the dropdown menu on the Buzzer tab, choose *Settings*.
5. Check the Enable Buzzer box to enable the buzzer.

   Uncheck the box to disable the buzzer.
6. Click the **Submit** button

   The changes take effect immediately.

Testing the Buzzer

You must enable the buzzer before you can test it. See “Making Buzzer Settings,” above.

To test the buzzer:

1. Click the Subsystem icon in Tree View.
2. Click the Controllers icon.
3. Click the Controller icon.

4. Click the **Buzzer** tab in Management View.
5. Click the **Sound** button.
   The buzzer sounds a continuous tone.
6. Click the **Mute** button.
   The buzzer goes silent but remains enabled.

Viewing Buzzer Information

This function refers to the buzzer on the SuperTrak RAID controller card.

To view buzzer information:

1. Click the Subsystem icon in Tree View.
2. Click the Controllers icon.
3. Click the Controller icon.
4. Click the **Buzzer** tab in Management View.

Managing Enclosures

This function of WebPAM PRO does not apply to the SuperTrak RAID controller card installed in the Host PC, except for one item:

- Viewing Enclosure Information (page 121)

Viewing Enclosure Information

Enclosure information includes:

- Enclosure ID
- Enclosure Type – Virtual
- SEP Firmware Version
- Maximum number of Controllers, Physical Drive Slots, Fans, Blowers, Temperature Sensors, Power Supply Units, Batteries, and Voltage Sensors.

This information might be useful when contacting Technical Support.

To view Enclosure information:

1. Click the Subsystem icon in Tree View.
2. Click the Enclosures icon.
3. Click the Enclosure icon.

   The Enclosure information appears on the Information tab.

See “SAS Connections and ID Numbers” on page 12,
“Viewing Controller Information” on page 115,
“Viewing Battery Information” on page 118, and
“Contacting Technical Support” on page 197.

Note

In addition to the SuperTrak EX Series, WebPAM PRO also supports Promise Subsystems.

For more information about managing those products with WebPAM PRO, see the online help or refer to the Subsystem’s *Product Manual.*

Managing Physical Drives

Managing Physical Drives deals with the physical disk drives under the SuperTrak RAID controller, including the following functions:

- Viewing a List of Physical Drives (page 122)
- Locating a Physical Drive (page 122)
- Making Global Physical Drive Settings (page 123)
- Viewing Physical Drive Information (page 123)
- Viewing Physical Drive Statistics (page 124)
- Making Physical Drive Settings (page 124)
- Forcing a Physical Drive Offline or Online (page 125)
- Forcing a Physical Drive Offline or Online (page 125)
- Clearing Stale and PFA Conditions (page 125)

Viewing a List of Physical Drives

To view a list of physical drives in this enclosure:

1. Click the Subsystem icon in Tree View.
2. Click the Enclosures icon.
3. Click the Enclosure icon.
4. Click the Physical Drives icon.

   The list of physical drives appears in Management View.

   Click the **PD** link to view a specific physical drive. See “Viewing Physical Drive Information” on page 123.

   Note that Enclosure and Slot numbers are assigned by the controller and do not necessarily correspond to the actual physical locations of the disk drives, especially when the disk drives are installed in an enclosure not designed by Promise.

   Also see “SAS Connections and ID Numbers” on page 12.

Locating a Physical Drive

Virtual or Third Party Enclosures

Support for this feature depends on how your system or enclosure was set up. Direct-connect systems with individual LED connections and SGPIO enclosures support individual physical drive LEDs. Other systems or enclosures might or might not support them.

To locate a physical drive in the enclosure, click the **Locate PDx** button. The LED for the carrier holding the physical drive will blink for one minute.

Promise Enclosures

To locate a physical drive in the enclosure, click the **Locate PDx** button. The disk status LED will blink for one minute to identify the carrier holding the physical drive.

Making Global Physical Drive Settings

Global settings apply to all of the physical disk drives installed under the SuperTrak controller. The functions include:

SATA Drives	SAS Drives
• Enable Write Cache	• Enable Write Cache
• Enable Read Look Ahead Cache	• Enable Read Look Ahead Cache
• Enable Command Queuing	• Enable Command Queuing
• DMA Mode	• Enable Read Look Ahead Cache

To make global physical drive settings:

1. Click the Subsystem icon in Tree View.
2. Click the Enclosures icon.
3. Click the Enclosure icon.
4. Click the Physical Drives icon.
5. Click the **Global Settings** tab in Management View.
6. Check the features you want to enable.

   Uncheck any features you want to disable.

   For SATA drives, choose *UDMA 5* in the DMA Mode dropdown menu.
7. Click the **Submit** button.

   The changes take effect immediately.

   The functions you enable here depend on whether the physical drives support those functions. See “Viewing Physical Drive Information” on page 123 to determine which functions a particular drive supports.

Viewing Physical Drive Information

To view physical drive information:

1. Click the Subsystem icon in Tree View.
2. Click the Enclosures icon.
3. Click the Enclosure icon.
4. Click the Physical Drives icon.

5. Click a Physical Drive icon.

Useful information provided here includes:

- **Operational Status** – OK is normal. Can also show Rebuilding, Forced Online, Forced Offline, Transition Running, PDM Running, Media Patrol Running, Stale, PFA, Offline or Dead.
- **Configuration Status** – The array to which the drive is assigned or its spare designation, including Unconfigured, Stale, PFA, Global Spare, Dedicated Spare, Revertible Global Spare, Revertible Dedicated Spare.

Adjustable Items

- **Write Cache** – Enabled or disabled as chosen on the Physical Drives Settings tab.
- **Read Look Ahead (Cache)** – Enabled or disabled as chosen on the Physical Drives Settings tab.
- **Command Queuing** – Enabled or disabled.

See “Making Global Physical Drive Settings” on page 123.

Viewing Physical Drive Statistics

To view physical drive statistics:

1. Click the Subsystem icon in Tree View.
2. Click the Enclosures icon.
3. Click the Enclosure icon.
4. Click the Physical Drives icon.
5. Click a Physical Drive icon.
6. From the dropdown menu on the Information tab, choose *Statistics*.

Making Physical Drive Settings

The only individual physical drive setting is an alias. An alias is optional. To set an alias for a physical drive:

1. Click the Subsystem icon in Tree View.
2. Click the Enclosures icon.
3. Click the Enclosure icon.
4. Click the Physical Drives icon.
5. Click a Physical Drive icon.
6. Click the **Settings** tab in Management View.
7. Type an alias into the Physical Drive Alias field.

Maximum of 32 characters. Use letters, numbers, one space between words, and underscore.

8. Click the **Submit** button.

Forcing a Physical Drive Offline or Online

The Physical Drive–Force Offline/Online tab enables you to force an:

- Online physical drive to go Offline
- Offline physical drive to go Online

The Force Offline/Online tab appears only for physical drives that are assigned to disk arrays.

Caution

Forcing a physical drive offline or online is likely to cause data loss. Back up your data before you proceed. Use these functions only when required.

To force a physical drive offline or online:

1. Click the Subsystem icon in Tree View.
2. Click the Enclosures icon.
3. Click the Enclosure icon.
4. Click the Physical Drives icon.
5. Click a Physical Drive icon.
6. Click the **Force Offline/Online** tab in Management View.
7. Click the **Submit** button.
8. In the confirmation box, type the word **confirm** in the field provided.
9. Click the **OK** button.

Clearing Stale and PFA Conditions

The Clear tab only appears when one or both conditions are present.

- **Stale** – The physical drive contains obsolete disk array information.
- **PFA** – The physical drive has errors resulting in a prediction of failure.

Be sure you have corrected the condition by a physical drive replacement, rebuild operation, etc., first. Then clear the condition.

To clear a Stale or PFA status from a physical drive:

1. Click the Subsystem icon in Tree View.
2. Click the Enclosures icon.

3. Click the Enclosure icon.
4. Click the Physical Drives icon.
5. Click a Physical Drive icon.
6. in Management View, click the **Clear** tab.
7. Click the **Submit** button.

Note

If a physical drive has both a Stale and a PFA condition, click the **Submit** button once to clear the Stale condition, then click again to clear the PFA condition.

Managing Disk Arrays

Disk Array Management includes the following functions:

- Viewing Disk Arrays (page 127)
- Locating a Disk Array (page 127)
- Creating a Disk Array (page 128)
- Deleting a Disk Array (page 134)
- Viewing Disk Array Information (page 134)
- Making Disk Array Settings (page 135)
- Creating a Logical Drive (page 136)
- Deleting a Logical Drive (page 137)
- Migrating a Disk Array (page 138)
- Rebuilding a Disk Array (page 139)
- Running PDM on a Disk Array (page 140)
- Transitioning a Disk Array (page 141)
- Preparing a Disk Array for Transport (page 141)

Viewing Disk Arrays

To view the disk arrays in this enclosure plus any expanded or cascaded enclosures:

1. Click the Subsystem icon in Tree View.
2. Click the Disk Arrays icon.

   A list of disk arrays appears in Management View.

   Click the **DA** link to view a specific disk array. See “Viewing Disk Array Information” on page 134.

Locating a Disk Array

Virtual or Third Party Enclosures

Support for this feature depends on how your system or enclosure was set up. Direct-connect systems with individual LED connections and SGPIO enclosures support individual physical drive LEDs. Other systems or enclosures might or might not support them.

To locate a disk array in the enclosure, click the **Locate DAx** button. The LEDs for the carriers holding the physical drives used by the disk array will blink for one minute.

Promise Enclosures

To locate a disk array in the enclosure, click the **Locate DAx** button. The disk status LEDs will blink for one minute to identify the carriers holding the physical drives used by the disk array.

Creating a Disk Array

WebPAM PRO provides three methods of creating a disk array:

- **Automatic** – Creates a default disk array and logical drive based on unconfigured physical drives in the system. No user choices. See “Creating a Disk Array – Automatic Configuration” on page 129.
- **Express** – You choose the RAID characteristics and type of application. Creates a disk array and logical drive(s) based on your input. See “Creating a Disk Array – Express Configuration” on page 130.
- **Advanced** – You specify all parameters for a new disk array. One logical drive will be made automatically when you create the disk array. If you specify less than the total available capacity, you can use the remaining space to create additional logical drives now or at a later time. See “Creating a Disk Array – Advanced Configuration” on page 132.

Creating a Disk Array – Automatic Configuration

The Disk Array – Automatic Configuration option enables you to create a new disk array following a default set of parameters. One logical drive will be made automatically when you create the disk array. To create a Disk Array using the Automatic function:

1. Click the Subsystem icon in Tree View.
2. Click the Disk Arrays icon.
3. From dropdown menu on the Create tab, choose *Automatic*.

   The following parameters display:

   - **Disk Arrays** – The number of physical drives in the disk array, their slot numbers, configurable capacity, and the number of logical drives to be created
   - **Logical Drives** – The ID number of the logical drive(s), their RAID level, capacity, and stripe size
   - **Spare Drives** – The physical drive slot number of the dedicated hot spare assigned to this disk array. A hot spare drive is created for all RAID levels except RAID 0, when five or more unconfigured physical drives are available
4. If you accept these parameters, click the **Submit** button.

   The new disk array appears in the Disk Array List the Information tab.

   If you do NOT accept these parameters, use the Advanced option to create your disk array.

Creating a Disk Array – Express Configuration

The Disk Array – Express Configuration option enables you to choose the parameters for a new disk array by specifying the characteristics you want. With this method, you can create multiple logical drives at the same time you create your disk array. However, all of the logical drives will be the same.

If you prefer to specific the parameters directly, use the Advanced option to create your disk array.

If you are uncertain about choosing parameters for your disk array, use the Automatic option.

To create a new disk array:

1. Click the Subsystem icon in Tree View.
2. Click the Disk Arrays icon.
3. From the dropdown menu on the Create tab, choose *Express*.
4. Check the boxes to choose any one or combination of:
   - **Redundancy** – The array will remain available if a physical drive fails
   - **Capacity** – The greatest possible amount of data capacity
   - **Performance** – The highest possible read/write speed
   - **Mixing SATA/SAS Drive** – Check this box if you want to use both SATA and SAS drives in the same disk array.

     If the box is unchecked, and you have both SATA and SAS drives, different arrays will be created for each type of drive.
5. In the Number of Logical Drives field, enter the number of logical drives you want to make from this disk array.
6. From the Application Type menu, choose an application that best describes your intended use for this disk array:
   - File Server
   - Video Stream
   - Transaction Data
   - Transaction Log
   - Other
7. Click the **Update** button.

   Or check the Automatic Update box and updates will occur automatically.

   The following parameters display:
   - **Disk Arrays** – The number of physical drives in the disk array, their slot numbers, configurable capacity, and the number of logical drives to be created

- **Logical Drives** – The slot number of the logical drive(s), their RAID level, capacity, and stripe size
- **Spare Drives** – The physical drive slot number of the dedicated hot spare assigned to this disk array (all RAID levels except RAID 0)

If you accept these parameters, proceed to the next step.

If you do NOT accept these parameters, review and modify your choices in the previous steps.

8. When you are done, click the **Submit** button.

The new disk array appears in the Disk Array List the Information tab.

Creating a Disk Array – Advanced Configuration

The Disk Array – Advanced Configuration option enables you to directly specify all parameters for a new disk array. One logical drive will be made automatically when you create the disk array. If you specify less than the total available capacity, you can use the remaining space to create additional logical drives now or at a later time.

If you are uncertain about choosing parameters for your disk array, use the Express or Automatic option to create your disk array.

To create a new disk array:

1. Click the Subsystem icon in Tree View.
2. Click the Disk Arrays icon.
3. From the dropdown menu on the Create tab, choose *Advanced*.

Step 1 – Disk Array Creation

1. Enter a name for the disk array in the field provided.
2. Check the box if you want to enable Media Patrol.

   For more information, see “Media Patrol” on page 184.
3. Check the box if you want to enable PDM.

   For more information, see “Predictive Data Migration (PDM)” on page 184.
4. Highlight physical drives you want in the disk array from the Available list and press the **>>** button to move them to the Selected list.

   You can also double-click them to move them.
5. When you are done, click the **Next** button.

Step 2 – Logical Drive Creation

Logical Drive Creation enables you to specify logical drives under the new disk array. Enter the information for a logical drive, then click the **Update** button. If there is free capacity remaining, you can specify another logical drive now or wait until later. You can create up to 32 logical drives per array.

1. Optional. Type an alias into the field provided.
2. Choose a RAID level for the logical drive from the dropdown menu.

   The choice of RAID levels depends the number of physical drives you selected.
3. RAID 50 and 60 only. Specify the number of axles for your array.

   See “RAID 50 Axles” on page 163 or “RAID 60 Axles” on page 166.
4. Specify a Capacity and the unit of measure (MB, GB, TB).

This value will be the data capacity of the first logical drive in your new disk array. If you specify less than disk array's maximum capacity, the remainder will be available for additional logical drives which you can create later.

5. Specify a Stripe size from the dropdown menu.

   64 KB, 128 KB, 256 KB, and 1 MB are available. 64 KB is the default.

6. Specify a Sector size from the dropdown menu.

   512 B, 1 KB, 2 KB, and 4 KB are available. 512 B is the default.

7. Specify a Read (cache) Policy from the dropdown menu.

   Read Cache, Read Ahead Cache, and No Cache are available. Read Ahead is the default.

8. Specify a Write (cache) Policy from the dropdown menu.

   Write Back and Write Through are available. Write Back is the default.

9. From the Initialization dropdown menu, choose an Initialization policy.

   None, *Quick*, and *Full* are available. None is the default but is not recommended. See “Initialization” on page 175.

10. Click the **Update** button.

    A new logical drive is displayed under New Logical Drives.

    Repeat the above steps to specify additional logical drives as desired.

11. When you are done specifying logical drives, click the **Next** button.

Step 3 – Summary

The Summary lists the disk array and logical drive information you specified.

To proceed with disk array and logical drive creation, click the **Submit** button.

The new disk array appears in the Disk Array List the Information tab.

Note

This function does not automatically create a hot spare drive. After the disk array is created, you can create a hot spare drive for it. For more information, see “Creating a Spare Drive” on page 150.

Deleting a Disk Array

The Disk Arrays–Delete tab enables you to delete existing disk arrays.

Caution

If you delete a disk array, you also delete any logical drives that belong to it, along with the data in those logical drives. Back up any important data before deleting a disk array.

To delete a disk array:

1. Click the Subsystem icon in Tree View.
2. Click the Disk Arrays icon.
3. Click the **Delete** tab in Management View.
4. Check the box to the left of the disk array you want to delete.
5. Click the **Submit** button.
6. In the confirmation box, type the word **confirm** in the field provided.
7. Click the **OK** button.

The chosen disk array disappears from the Disk Array List the Information tab.

Viewing Disk Array Information

To view Disk Array information:

1. Click the Subsystem icon in Tree View.
2. Click the Disk Arrays icon.
3. Click the Disk Array icon.
   The disk array information is shown in Management View.

Disk Array Operational Status

- **OK** – This is the normal state of a logical drive. When a logical drive is Functional, it is ready for immediate use. For RAID Levels other than RAID 0, the logical drive has full redundancy.
- **Synchronizing** – This condition is temporary. Synchronizing is a maintenance function that verifies the integrity of data and redundancy in the logical drive. When a logical drive is Synchronizing, it will function and your data is available. However, access will be slower due to the synchronizing operation.
- **Critical / Degraded** – This condition arises as the result of a physical drive failure. A degraded logical drive will still function and your data is still

available. However, the logical drive has lost redundancy (fault tolerance). You must determine the cause of the problem and correct it.

- **Rebuilding** – This condition is temporary. When a physical drive has been replaced, the logical drive automatically begins rebuilding in order to restore redundancy (fault tolerance). When a logical drive is rebuilding, it will function and your data is available. However, access will be slower due to the rebuilding operation.
- **Transport Ready** – After you perform a successful Prepare for Transport operation, this condition means you can remove the physical drives of this disk array and move them to another enclosure or different drive slots. After you relocate the physical drives, the disk array status will show OK.

Physical Drive Status

- **OK** – This is the normal state of a physical drive.
- **Forced Offline** – This drive was forced offline by the user.
- **Forced Online** – This drive was forced online by the user.
- **Transition Running** – A Transition is running that involves this physical drive.
- **PDM Running** – PDM is running on this physical drive.
- **Media Patrol Running** – Media Patrol is running on this physical drive.
- **Stale** – The physical drive contains obsolete disk array information. Click the Clear tab.
- **PFA** – The physical drive has errors resulting in a prediction of failure. Click the Clear tab.
- **Offline** – This condition arises as the result of a second physical drive failure. An Offline logical drive is not accessible but some or all of your data may remain intact. You must determine the cause of the problem and correct it.
- **Dead** – The physical drive has failed.

Making Disk Array Settings

To make Disk Array settings:

1. Click the Subsystem icon in Tree View.
2. Click the Disk Arrays icon.
3. Click the Disk Array icon.
4. Click the **Settings** tab in Management View.
5. Optional. Enter an alias in the Disk Array Alias field.

Maximum of 32 characters. Use letters, numbers, one space between words, and underscore. An alias is optional.

6. To enable Media Patrol support, check the Media Patrol box.
7. To enable PDM support, check the PDM box.
8. Click the **Submit** button.

Creating a Logical Drive

When you create a disk array, you automatically create one logical drive also. If the initial logical drive used less than the full capacity of the disk array, you can create additional logical drives from the same disk array. You can create up to 32 logical drives per array.

To create a logical drive:

1. Click the Subsystem icon in Tree View.
2. Click the Disk Arrays icon.
3. Click the Disk Array icon.
4. Click the **Create LD** tab in Management View.
5. Optional. Enter an alias (name) in the Alias field.

   Maximum of 32 characters. Use letters, numbers, one space between words, and underscore. An alias is optional.
6. From the RAID Level dropdown list, choose a RAID level for this logical drive.

   All RAID levels supported by the disk array appear in the list. See “Choosing a RAID Level” on page 168.
7. Enter a capacity and choose unit of measure (MB, GB, TB).

   The default value is the available capacity of the disk array. You can use this value or any lesser amount.
8. From the Stripe dropdown menu, choose a Stripe size for this logical drive.

   The choices are *64 KB*, *128 KB*, *256 KB*, *512 KB*, and *1 MB*. 64 KB is the default. See “Choosing Stripe Block Size” on page 172.
9. From the Sector dropdown menu, choose a Sector size for this logical drive.

   The choices are *512 B*, *1 KB*, *2 KB*, and *4 KB*. 512 B is the default. See “Choosing Sector Size” on page 172.
10. From the Read Policy dropdown menu, choose a Read Cache policy for this logical drive.

    The choices are *Read Cache*, *Read Ahead*, and *No Cache*. Read Ahead is the default. See “Choosing Cache Policy” on page 173.

11. From the Write Policy dropdown menu, choose a Write Cache policy for this logical drive.

    The choices are *Write Through* and *Write Back*. Write Back is the default. If you chose No Cache under Read Cache, this setting will be Write Through. See “Choosing Cache Policy” on page 173.

12. From the Initialization dropdown menu, choose an Initialization policy.

    The choices are *None*, *Quick* and *Full.* See “Initialization” on page 175.

13. Click the **Update** button to enter the logical drive parameters.
14. Review the results. If there is remaining space the disk array, you can create another logical drive, following the steps above. Each logical drive can have a different set of parameters.
15. Click the **Next** button when you are done.

    A new window displays with the disk array information and the proposed logical drives with their parameters.

16. Click the **Submit** button create the logical drives.

The new logical drive appears in the Logical Drive List the Information tab.

If you created a fault-tolerant logical drive (any RAID level except RAID 0), the Operational Status of new logical drive will display *Synchronizing* for several minutes after creation. You can use the logical drive during this period but read/write performance could be slower than normal.

Deleting a Logical Drive

Caution

All data the logical drive will be lost. Back up any valuable data before deleting the logical drive.

To delete a logical drive:

1. Click the Subsystem icon in Tree View.
2. Click the Disk Arrays icon.
3. Click the Disk Array icon.
4. Click the **Delete LD** tab in Management View.
5. Check the box to the left of the logical drive you want to delete.
6. Click the **Submit** button.

   In the confirmation box, type the word **confirm** in the field provided.

7. Click the **OK** button.

The chosen logical disappears from the Logical Drive List the Information tab.

Migrating a Disk Array

On SuperTrak, RAID level migration is performed on the disk array but it applies to the logical drives. The action of migrating a disk array means either or both:

- Change its RAID Level
- Increase the number of disk drives (sometimes called *expansion*)

For a list of Migration options and other important information, see “RAID Level Migration” on page 176.

To Migrate an existing disk array:

1. Click the Subsystem icon in Tree View.
2. Click the Disk Arrays icon.
3. Click the Disk Array icon.
4. From the dropdown menu on the Background Activities tab, choose *Start Migration*.
5. Highlight physical drives you want in the disk array from the Available list and press the >> button to move them to the Selected list. You can also double-click them to move them.
6. When you are done, click the **Next** button
7. Choose a new RAID Level, if desired
8. To expand the capacity of one or more logical drives, check the Expand Capacity box
9. If you checked the Expand Capacity box, enter a number into the Capacity field and choose the appropriate unit of measure (MB, GB, TB)
10. Under Capacity Usage, highlight the logical drive whose RAID level you want to change or whose capacity you want to expand
11. Click the **Update** button.

    The logical drive changes to reflect your choices.
12. Update other logical drives using the same method.
13. When you are done making changes, click the **Next** button.
14. Click the **Submit** button to begin Migration.

    In the confirmation box, type the word **confirm** in the field provided.
15. Click the **OK** button.

To set Migration priority, see “Making Background Activity Settings” on page 109.

Rebuilding a Disk Array

When you rebuild a disk array, you are actually rebuilding the data on a replacement physical drive.

Rebuilding Automatically

Normally, a disk array would rebuild itself using a hot disk drive, after going Critical. However, if the Auto Rebuild function is disabled or no spare drives are available, you must initiate the procedure.

To enable Auto Rebuild, see “Making Background Activity Settings” on page 109.

To create a spare drive, see “Creating a Spare Drive” on page 150.

For more information, see “Hot Spare Drive(s)” on page 175.

Rebuilding Manually

If a physical drive has failed, identify and replace the drive, then rebuild the disk array as described below:

1. Click the Subsystem icon in Tree View.
2. Click the Disk Arrays icon.
3. Click the Disk Array icon.

   If there are multiple disk arrays, choose the icon with the yellow !.
4. From the dropdown menu on the Background Activity tab, choose *Start Rebuild*.
5. Choose Source physical drive.

   This is a remaining functional physical drive in the disk array.
6. Choose the Target physical drive.

   This is the replacement physical drive.
7. Click the **Submit** button.

The Disk Array Background Activity tab will show the rebuild the replacement (target) physical drive. Depending the size of the physical disk involved, this process will take some time.

To view more information, click the **Rebuild on PDx** link.

To set Rebuild priority, see “Making Background Activity Settings” on page 109.

Running Media Patrol on a Disk Array

Media Patrol checks the magnetic media on physical drives. When it finds the specified number of bad blocks, it will trigger PDM. See “Making Background Activity Settings” on page 109 and “Running PDM” on page 110.

You can schedule Media Patrol to run automatically, see “Scheduling an Activity” on page 111.

To start Media Patrol:

1. Click the Subsystem icon in Tree View.
2. Click the Disk Arrays icon.
3. Click the Disk Array icon.
4. From the dropdown menu on the Background Activities tab, choose *Start Media Patrol*.
5. Click the **Start** button.

Running PDM on a Disk Array

Predictive Data Migration (PDM) migrates data from the suspect physical drive to a spare physical drive, similar to Rebuilding. But unlike Rebuilding, PDM acts *before* the disk drive fails and your Logical Drive goes Critical.

See “Predictive Data Migration (PDM)” on page 184.

To start PDM:

1. Click the Subsystem icon in Tree View.
2. Click the Disk Arrays icon.
3. Click the Disk Array icon.
4. From the dropdown menu on the Background Activities tab, choose *Start PDM*.
5. In the next screen, choose the *Source* and *Target* physical drives.

   The suspect physical drive is the Source. The replacement physical drive is the Target.
6. Click the **Start** button.

Transitioning a Disk Array

Transition is the process of replacing a revertible spare drive that is currently part of a disk array with an unconfigured physical drive or a non-revertible spare. The revertible spare drive returns to its original status. For more information, see “Transition” on page 185.

In order to run the Transition function:

- The spare drive must be Revertible.
- You must specify an unconfigured physical drive of the same or larger capacity to replace the revertible spare drive.

To run Transition:

1. Click the Subsystem icon in Tree View.
2. From the dropdown menu on the Background Activities tab, choose *Start Transition*.
3. Choose an unconfigured physical drive from the list of available drives.

After Transition is completed, refresh the screen. The revertible spare drive will be listed under the Spare Drives icon and the disk array’s operational status will show OK.

To set Transition priority, see “Making Background Activity Settings” on page 109.

Preparing a Disk Array for Transport

Important

Before you can use this feature:

- There must be a dedicated spare disk drive assigned to this disk array.
- The disk array’s Operational Status must be OK.

To prepare a disk array for transport:

1. Click the Subsystem icon in Tree View.
2. Click the Disk Arrays icon.
3. Click the Disk Array icon.
4. Click the **Transport** tab in Management View.
5. Click the **Submit** button.
6. In the confirmation box, type the word **confirm** in the field provided.

7. Click the **OK** button.
8. After the Transition is complete, move the physical drives comprising the disk array to their new locations.
9. Click the **Refresh** button in your Browser.

   The drives appear in their new locations and disk array status displays OK.

Managing Logical Drives

Logical drives are made from disk arrays. In the Tree, you can see a graphic representation of the logical drives that belong to each array. You can see a summary of all logical drives in the subsystem under Logical Drive Summary.

Logical drive management includes the following functions:

- Viewing Information for All Logical Drives (page 143)
- Locating a Logical Drive (page 144)
- Viewing Logical Drive Information (page 144)
- Viewing Logical Drive Statistics (page 145)
- Changing Logical Drive Settings (page 145)
- Initializing a Logical Drive (page 146)
- Running Redundancy Check (page 147)
- Viewing the Logical Drive Check Table (page 147)

Viewing Information for All Logical Drives

To view information about all logical drives in a disk array:

1. Click the Subsystem icon in Tree View.
2. Click the Disk Arrays icon.
3. Click the Disk Array icon.
4. Click the Logical Drives icon

Logical Drive Status

- **OK** – This is the normal state of a logical drive. When a logical drive is Functional, it is ready for immediate use. For RAID Levels other than RAID 0 (Striping), the logical drive has full redundancy.
- **Synchronizing** – This condition is temporary. Synchronizing is a maintenance function that verifies the integrity of data and redundancy in the logical drive. When a logical drive is Synchronizing, it will function and your data is available. However, access will be slower due to the synchronizing operation.
- **Critical/Degraded** – This condition arises as the result of a physical drive failure. A degraded logical drive will still function and your data is still available. However, the logical drive has lost redundancy (fault tolerance). You must determine the cause of the problem and correct it.
- **Rebuilding** – This condition is temporary. When a physical drive has been replaced, the logical drive automatically begins rebuilding in order to restore redundancy (fault tolerance). When a logical drive is rebuilding, it will

function and your data is available. However, access will be slower due to the rebuilding operation.

To create a logical drive, see “Creating a Logical Drive” on page 136.

To delete a logical drive, see “Deleting a Logical Drive” on page 137.

For a Degraded or Offline logical drive, see “Critical & Offline Logical Drives” on page 189.

Locating a Logical Drive

Virtual or Third Party Enclosures

Support for this feature depends on how your system or enclosure was set up. Direct-connect systems with individual LED connections and SGPIO enclosures support individual physical drive LEDs. Other systems or enclosures might or might not support them.

To locate a logical drive in the enclosure, click the **Locate LDx** button. The LEDs for the carriers holding the physical drives used by the logical drive will blink for one minute.

Promise Enclosures

To locate a logical drive in the enclosure, click the **Locate LDx** button. The disk status LEDs will blink for one minute to identify the carriers holding the physical drives used by the logical drive.

Viewing Logical Drive Information

To view information for a single logical drive:

1. Click the Subsystem icon in Tree View.
2. Click the Disk Arrays icon.
3. Click the Disk Array icon.
4. Click the Logical Drives icon
5. Click the Logical Drive icon.

To specify an Alias or set the Read and Write Policies, click the Settings tab.

Logical Drive Status

See “Logical Drive Status” on page 143.

Logical Drive Synchronization

Synchronization is an automatic procedure applied to logical drives when they are created. *Yes* means the logical drive was synchronized.

Adjustable Items

- Alias – Optional
- Read Policy
- Write Policy

See “Changing Logical Drive Settings” on page 145.

Viewing Logical Drive Statistics

To view information for a single logical drive:

1. Click the Subsystem icon in Tree View.
2. Click the Disk Arrays icon.
3. Click the Disk Array icon.
4. Click the Logical Drives icon
5. Click the Logical Drive icon.
6. From the dropdown menu on the Information tab, choose *Statistics*.

Changing Logical Drive Settings

To make logical drive settings:

1. Click the Subsystem icon in Tree View.
2. Click the Disk Arrays icon.
3. Click the Disk Array icon.
4. Click the Logical Drives icon
5. Click the Logical Drive icon.
6. Click the **Settings** tab in Management View.
7. Optional. Enter an alias in the Logical Drive Alias field.

   Maximum of 32 characters. Use letters, numbers, one space between words, and underscore. An alias is optional.
8. From the Read Policy dropdown menu, choose a Read Cache policy.

   The choices are *Read Cache*, *Read Ahead*, and *No Cache*. See “Choosing Cache Policy” on page 173.
9. From the Write Policy dropdown menu, choose a Write Cache policy.

   The choices are *Write Back* and *Write Through*. If you chose No Read Cache, Write policy is automatically Write Through. See “Choosing Cache Policy” on page 173.

10. Click the **Submit** button.

Initializing a Logical Drive

Initialization sets the data bits in the logical drive to zero. The action removes any residual data left behind from earlier configurations. Initialization is recommended for new logical drives. You can also initialize an existing logical drive. See “Initialization” on page 175 for more information.

Warning

When you initialize a logical drive, all the data the logical drive will be lost. Backup any important data before you initialize a logical drive.

To initialize a logical drive:

1. Click the Subsystem icon in Tree View.
2. Click the Logical Drive Summary icon.
3. Click the icon of the logical drive you want to Initialize.
4. From the dropdown menu on the Background Activities tab, choose *Initialization*.
   - To choose Quick Initialization, check the box.
   - If you checked the Quick Initialization box, enter a value in the Quick Initialization Size field. This value is the size of the initialization blocks in MB.
   - If you did not choose Quick Initialization, enter a hexidecimal value in the Initialization Pattern in Hex field or use the default 00000000 value.
5. Click the **Submit** button.
6. In the confirmation box, type the word **confirm** in the field provided.
7. Click the **OK** button.

To view the progress of the Initialization, click the **Background Activity** tab.

To set Initialization priority, see “Making Background Activity Settings” on page 109.

You can also start Initialization from the Subsystem icon, Background Activities tab.

Running Redundancy Check

Redundancy Check is a routine maintenance procedure for fault-tolerant disk arrays (those with redundancy) that ensures all the data matches exactly. Redundancy Check can also correct inconsistencies. You can also schedule a Redundancy Check. See “Scheduling an Activity” on page 111.

Redundancy Check a Logical Drive:

1. Click the Subsystem icon in Tree View.
2. Click the Logical Drive Summary icon.
3. Click the icon of the logical drive you want to Redundancy Check.
4. From dropdown menu on the Background Activities tab, choose *Redundancy Check*.
   - To choose *Auto Fix*, check the box.

     This feature attempts to repair the problem when it finds an error.
   - To choose *Pause On Error*, check the box.

     This feature stops the process when it finds an error.

     If Auto Fix is also checked, the process stops only when it finds a non-repairable error.
5. Click the **Submit** button.

To view the progress of the Redundancy Check, click the Background Activity tab.

To set Redundancy Check priority, see “Making Background Activity Settings” on page 109.

You can also start Redundancy check from the Subsystem icon Background Activities tab

Viewing the Logical Drive Check Table

The Logical Drive Check Table displays errors related to a logical drive. Use this information to evaluate the integrity of the logical drive and to determine whether corrective action is needed. To View the tables:

1. Click the Subsystem icon in Tree View.
2. Click the Disk Arrays icon.
3. Click the Disk Array icon.
4. Click the Logical Drives icon
5. Click the Logical Drive icon.

6. Click the **Check Table** tab in Management View.
7. Click the option for the table you want to see.

   The default is All tables.

   If there are entries, they are listed as follows:

   - **Entry Number** – A number assigned to each block of entry.
   - **Table Type** – Read Check, Write Check or Inconsistent Block (see below).
   - **Start Logical Block Address** – LBA of the first block for this entry.
   - **Count** – Number of continuous blocks starting from this LBA.
   - **Read Check Table** – Contains a list of read errors for this logical drive.
   - **Write Check Table** – Contains a list of write errors for this logical drive.
   - **Inconsistent Block Table** – Contains a list of inconsistent blocks for this logical drive.
     - Mirror data for RAID Levels 1, 1E, and 10.
     - Parity data for RAID Levels 5, 6, 50, and 60.
     - Inconsistent blocks are identified by the Redundancy Check.

Managing Spare Drives

When a physical drive in a disk array fails and a spare drive of adequate capacity is available, the disk array will begin to rebuild automatically using the spare drive. See “Critical & Offline Logical Drives” on page 189.

Spare drive management includes the following functions:

- Viewing a List of Spare Drives (page 149)
- Creating a Spare Drive (page 150)
- Deleting Spare Drive (page 151)
- Making Spare Drive Settings (page 151)
- Running Spare Check (page 152)

Viewing a List of Spare Drives

To view a list of spare drives:

1. Click the Subsystem icon in Tree View.
2. Click the Spare Drives icon.

The information includes:

- **ID** – The unique ID number assigned to the spare drive.
- **Operational Status** – OK is normal. Can also show Rebuilding, Transition Running, PDM Running, or Offline.
- **Physical Drive ID** – The ID number of the physical drive assigned as a spare
- **Capacity** – The data storage capacity of this spare drive.
- **Revertible** – Yes or No. A revertible spare drive automatically returns to its spare drive assignment after the failed physical drive in the disk array is replaced. See “Transition” on page 185 for more information.
- **Type** – Global, can be used by any disk array. Dedicated, can only be used by the assigned disk arrays.
- **Dedicated to Disk Arrays** – For dedicated spares, the disk arrays to which they are assigned. Global spares show N/A.

Creating a Spare Drive

Important

- There must be an unconfigured physical drive available to assign as a spare drive. See “Viewing a List of Physical Drives” on page 122.
- Be sure the spare drive you choose has capacity equal to or greater than the smallest physical drive assigned to the disk array.

To create a spare drive:

1. Click the Subsystem icon in Tree View.
2. Click the Spare Drives icon.
3. Click the **Create** tab in Management View.
4. Choose a spare type, *Global* or *Dedicated*.
5. To make a revertible spare drive, check the Revertible box.
6. To enable Media Patrol on this spare drive, check the Enable Media Patrol box.
7. In the Physical drives field, highlight the physical drive you want to assign as a spare drive in the Available list and press the **>>** button to move the drive to the Selected list.

   You can also double-click drives to move them.
8. If you chose a *Dedicated* spare drive, in the Dedicated to Disk Arrays field, highlight disk array to which you want assign the spare drive from the Available list and press the **>>** button to move the array to the Selected list.

   You can also double-click arrays to move them.
9. Click the **Update** button.

   Your choices are displayed under New Hot Spare Drives.
10. If you agree with the proposed choices, click the **Submit** button.

Deleting Spare Drive

Note

If an existing spare drive has the wrong parameters for your needs, click the Settings tab to change the parameters rather than delete the spare drive and create a new one.

To delete a spare drive:

1. Click the Subsystem icon in Tree View.
2. Click the Spare Drives icon.
3. Click the **Delete** tab in Management View.
4. Check the box to the left of the spare drive you want to delete.
5. Click the **Submit** button.

   In the confirmation box, type the word **confirm** in the field provided.
6. Click the **OK** button.

Making Spare Drive Settings

The Spare Drive–Settings tab enables you to change the settings of an existing spare drive. To change spare drive settings:

1. Click the Subsystem icon in Tree View.
2. Click the Spare Drives icon.
3. Click the Spare Drive icon.
4. Click the **Settings** tab in Management View.
5. Choose a spare type, *Global* or *Dedicated*.
6. To make a revertible spare drive, check the Revertible box.
7. To enable Media Patrol on this spare drive, check the Enable Media Patrol box.
8. If you chose a *Dedicated* spare drive, in the Dedicated to Disk Arrays field, highlight the disk array to which you want assign the spare drive from the Available list and press the **>>** button to move them to the Selected list.

   You can also double-click array to move it.
9. Click the **Submit** button.

Running Spare Check

Spare Check verifies the operational status of your spare drives. You can also schedule a Spare Check. See “Scheduling an Activity” on page 111.

To check a spare drive:

1. Click the Subsystem icon in Tree View.
2. Click the Spare Drives icon.
3. Click the **Spare Check** tab in Management View.
4. From the Physical Drive dropdown menu, choose the spare drive you want to check.

   Or choose *All* to check all the spare drives at the same time.
5. Click the **Submit** button.

The results of the Spare Check appear under Spare Check Status in the Information tab. “Healthy” means normal condition.

Working with the Logical Drive Summary

The Logical Drive Summary displays a list of all logical drives under the SuperTrak controller including logical drives in expanded or cascaded enclosures. This list does not arrange the logical drives under the disk array to which they belong nor under the enclosure in which they are located.

Logical Drive Summary includes the following functions:

- Viewing a List of All Logical Drives (page 153)
- Locating a Logical Drive (page 153)
- Viewing Individual Logical Drive Information (page 153)

Viewing a List of All Logical Drives

To view a list of all logical drives in all enclosures:

1. Click the Subsystem icon in Tree View.
2. Click the Logical Drive Summary icon.

Locating a Logical Drive

Virtual or Third Party Enclosures

Support for this feature depends on how your system or enclosure was set up. Direct-connect systems with individual LED connections and SGPIO enclosures support individual physical drive LEDs. Other systems or enclosures might or might not support them.

To locate a logical drive in the enclosure, click the **Locate LDx** button. The LEDs for the carriers holding the physical drives used by the logical drive will blink for one minute.

Promise Enclosures

To locate a logical drive in the enclosure, click the **Locate LDx** button. The disk status LEDs will blink for one minute to identify the carriers holding the physical drives used by the logical drive.

Viewing Individual Logical Drive Information

1. Click the Subsystem icon in Tree View.
2. Click the Logical Drive Summary icon.
3. Click the Logical Drive icon.

   The information and location for the logical drive appear in Management View. See Viewing Logical Drive Information (page 144).

Chapter 6: Technology Background

- Introduction to RAID (below)
- Choosing a RAID Level (page 168)
- Choosing Stripe Block Size (page 172)
- Choosing Sector Size (page 172)
- Choosing Cache Policy (page 173)
- Capacity Coercion (page 174)
- Initialization (page 175)
- Hot Spare Drive(s) (page 175)
- Partition and Format the Logical Drive (page 176)
- RAID Level Migration (page 176)
- Media Patrol (page 184)
- Predictive Data Migration (PDM) (page 184)
- Transition (page 185)
- Critical & Offline Logical Drives (page 189)

Introduction to RAID

RAID (Redundant Array of Independent Disks) allows multiple physical drives to be combined together in a disk array. Then all or a portion of the disk array is formed into a logical drive. The operating system sees the logical drive as a single storage device, and treats it as such.

The RAID software and controller manage all of the individual drives. The benefits of a RAID can include:

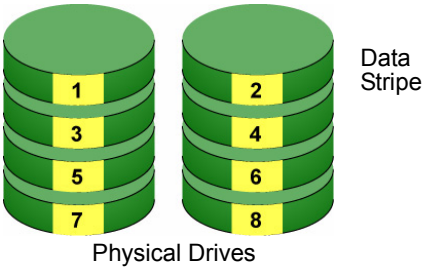
- Higher data transfer rates for increased server performance
- Increased overall storage capacity for a single drive designation (such as, C, D, E, etc.)
- Data redundancy/fault tolerance for ensuring continuous system operation in the event of a hard drive failure

Different types of logical drives use different organizational models and have varying benefits. Also see “Choosing a RAID Level” on page 168. The following outline breaks down the properties for each type of RAID logical drive:

RAID 0 – Stripe

When a logical drive is striped, the read and write blocks of data are interleaved between the sectors of multiple physical drives. Performance is increased, since the workload is balanced between drives or “members” that form the logical drive. Identical drives are recommended for performance as well as data storage efficiency.

Figure 1. RAID 0 Striping interleaves data across multiple drives



The logical drive's data capacity equals the capacity of the smallest physical drive times the number of physical drives. For example, one 100 GB and three 120 GB drives will form a 400 GB (4 x 100 GB) logical drive instead of 460 GB.

If physical drives of different capacities are used, there will also be unused capacity on the larger drives.

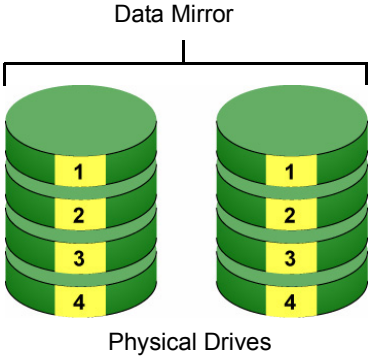
RAID 0 logical drives on SuperTrak consist of one or more physical drives.

RAID 1 – Mirror

When a logical drive is mirrored, identical data is written to a pair of physical drives, while reads are performed in parallel. The reads are performed using elevator seek and load balancing techniques where the workload is distributed in the most efficient manner. Whichever drive is not busy and is positioned closer to the data will be accessed first.

With RAID 1, if one physical drive fails or has errors, the other mirrored physical drive continues to function. Moreover, if a spare physical drive is present, the spare drive will be used as the replacement drive and data will begin to be mirrored to it from the remaining good drive.

Figure 2. RAID 1 Mirrors identical data to two drives



The logical drive's data capacity equals the smaller physical drive. For example, a 100 GB physical drive and a 120 GB physical drive have a combined capacity of 100 GB in a mirrored logical drive.

If physical drives of different capacities are used, there will be unused capacity on the larger drive.

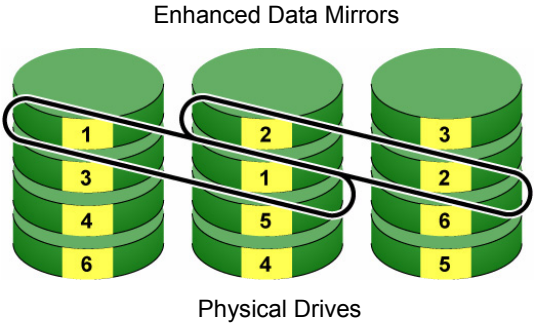
RAID 1 logical drives on SuperTrak consist of two physical drives.

If you want a mirrored logical drive with more than two physical drives, see "RAID 1E – Enhanced Mirror" on page 158 and "RAID 10 – Mirror / Stripe" on page 161.

RAID 1E – Enhanced Mirror

RAID 1E offers the security of mirrored data provided by RAID 1 plus the added capacity of more than two physical drives. It also offers overall increased read/write performance plus the flexibility of using an odd number of physical drives. With RAID 1E, each data stripe is mirrored onto two physical drives. If one drive fails or has errors, the other drives continue to function, providing fault tolerance.

Figure 3. RAID 1E can mirror data over an odd number of drives



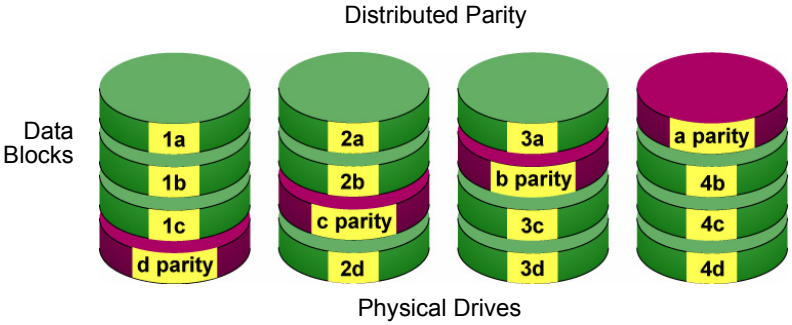
The advantage of RAID 1E is the ability to use an odd number of physical drives, unlike RAID 1 and RAID 10. You can also create a RAID 1E Logical Drive with an even number of physical drives. However, with an even number of drives, you will obtain somewhat greater security with comparable performance using RAID 10.

RAID 1E logical drives consist of three or more physical drives. You can create an array with just two physical drives and specify RAID 1E. But the resulting array will actually be a RAID 1.

RAID 5 – Block Striping with Distributed Parity

RAID 5 organizes block data and parity data across the physical drives. Generally, RAID Level 5 tends to exhibit lower random write performance due to the heavy workload of parity recalculation for each I/O. RAID 5 is generally considered to be the most versatile RAID level. It works well for file, database, application and web servers.

Figure 4. RAID 5 stripes all drives with data and parity information



The capacity of a RAID 5 logical drive equals the smallest physical drive times the number of physical drives, minus one. Hence, a RAID 5 logical drive with four 100 GB physical drives will have a capacity of 300 GB. A RAID 5 logical drive with two 120 GB physical drives and one 100 GB physical drive will have a capacity of 200 GB.

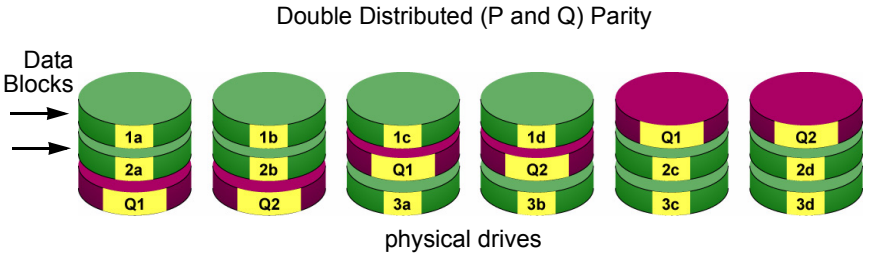
RAID 5 is generally considered to be the most versatile RAID level.

A RAID 5 on SuperTrak consists of 3 to 16 physical drives.

RAID 6 – Block and Double Parity Stripe

RAID level 6 stores dual parity data is rotated across the physical drives along with the block data. A RAID 6 logical drive can continue to accept I/O requests when any *two* physical drives fail.

Figure 5. RAID 6 stripes all drives with data and dual parity



The total capacity of a RAID 6 logical drive is the smallest physical drive times the number of physical drives, minus two.

Hence, a RAID 6 logical drive with (7) 100 GB physical drives will have a capacity of 500 GB. A RAID 6 logical drive with (4) 100 GB physical drives will have a capacity of 200 GB.

RAID 6 becomes more capacity efficient in terms of physical drives as the number of physical drives increases.

RAID 6 provides double fault tolerance. Your logical drive remains available when up to *two* physical drives fail.

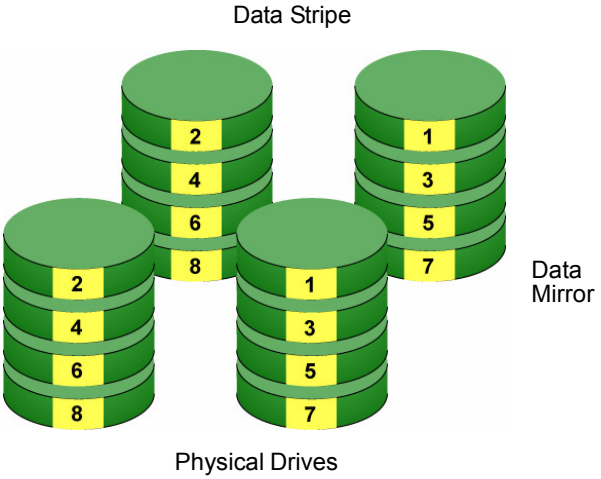
RAID 6 is generally considered to be the safest RAID level.

A RAID 6 on SuperTrak consists of 4 to 16 physical drives.

RAID 10 – Mirror / Stripe

Mirror/Stripe combines both of the RAID 0 and RAID 1 logical drive types. RAID 10 is similar though not identical to RAID 0+1. It can increase performance by reading and writing data in parallel while protecting data with duplication. The data on one drive pair is mirrored together, then striped over a second drive pair.

Figure 6. RAID 10 takes a data mirror on one drive pair and stripes it over a second drive pair



The data capacity RAID 10 logical drive equals the capacity of the smallest physical drive times the number of physical drives, divided by two.

In some cases, RAID 10 offers double fault tolerance, depending on which physical drives fail.

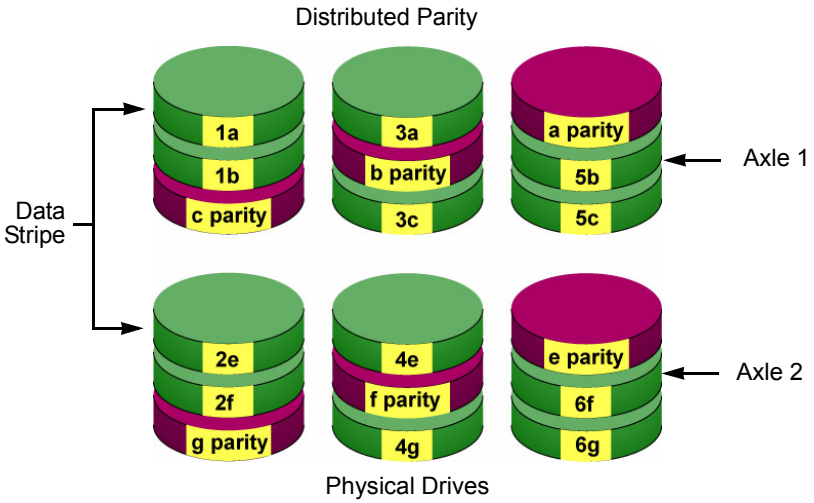
RAID 10 arrays require an even number of physical drives and a minimum of four.

For RAID 10 characteristics with an odd number of physical drives, use RAID 1E.

RAID 50 – Striped Distributed Parity

RAID 50 combines both RAID 5 and RAID 0 features. Data is striped across physical drives as in RAID 0, and it uses distributed parity as in RAID 5. RAID 50 provides data reliability, good overall performance, and supports larger volume sizes.

Figure 7. RAID 50 is a combination of RAID 5 and RAID 0



The data capacity RAID 50 logical drive equals the capacity of the smallest physical drive times the number of physical drives, minus two.

RAID 50 also provides very high reliability because data is still available even if multiple physical drives fail (one in each axle). The greater the number of axles, the greater the number of physical drives that can fail without the RAID 50 logical drive going offline.

Component	Minimum	Maximum
Number of Axles	2	16
Physical Drives per Axle	3	16
Physical Drives per Logical Drive	6	256

RAID 50 Axles

When you create a RAID 50, you must specify the number of axles. An axle refers to a single RAID 5 logical drive that is striped with other RAID 5 logical drives to make RAID 50. An axle can have from 3 to 16 physical drives, depending on the number of physical drives in the logical drive.

The chart below shows RAID 50 logical drives with 6 to 16 physical drives, the available number of axles, and the resulting distribution of physical drives on each axle.

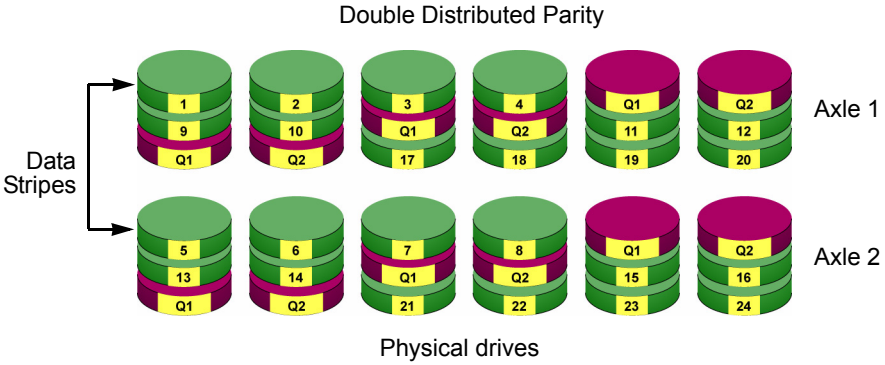
RAID 50 Logical Drive		
No. of Drives	**No. of Axles**	**Drives per Axle**
6	2	3,3
7	2	3,4
8	2	4,4
9	2	4,5
	3	3,3,3
10	2	5,5
	3	3,3,4
11	2	5,6
	3	3,4,4
12	2	6,6
	3	4,4,4
	4	3,3,3,3
13	2	6,7
	3	4,4,5
	4	3,3,3,4
14	2	7,7
	3	4,5,5
	4	3,3,4,4

RAID 50 Logical Drive		
No. of Drives	**No. of Axles**	**Drives per Axle**
15	2	7,8
	3	5,5,5
	4	3,4,4,4
	5	3,3,3,3,3
16	2	8,8
	3	5,5,6
	4	4,4,4,4
	5	3,3,3,3,4

RAID 60 – Striping of Double Parity

RAID 60 combines both RAID 6 and RAID 0 features. Data is striped across disks as in RAID 0, and it uses double distributed parity as in RAID 6. RAID 60 provides data reliability, good overall performance and supports larger volume sizes.

Figure 8. RAID 60 is a combination of RAID 6 and RAID 0



The total capacity of a RAID 60 logical drive is the smallest physical drive times the number of physical drives, minus four.

RAID 60 also provides very high reliability because data is still available even if multiple physical drives fail (two in each axle). The greater the number of axles, the greater the number of physical drives that can fail without the RAID 60 logical drive going offline.

Component	Minimum	Maximum
Number of Axles	2	16
Physical Drives per Axle	4	16
Physical Drives per Logical Drive	8	256

RAID 60 Axles

When you create a RAID 60, you must specify the number of axles. An axle refers to a single RAID 6 logical drive that is striped with other RAID 6 logical drives to make RAID 60. An axle can have from 4 to 16 physical drives, depending on the number of physical drives in the logical drive.

The chart below shows RAID 60 logical drives with 8 to 20 physical drives, the available number of axles, and the resulting distribution of physical drives on each axle.

RAID 60 Logical Drive		
No. of Drives	**No. of Axles**	**Drives per Axle**
8	2	4,4
9	2	4,5
10	2	5,5
11	2	5,6
12	2	6,6
	3	4,4,4
13	2	6,7
	3	4,4,5
14	2	7,7
	3	4,5,5
15	2	7,8
	3	5,5,5
16	2	8,8
	3	5,5,6
	4	4,4,4,4
17	2	8,9
	3	5,6,6
	4	4,4,4,5

RAID 60 Logical Drive		
No. of Drives	**No. of Axles**	**Drives per Axle**
18	2	9,9
	3	6,6,6
	4	4,4,5,5
19	2	9,10
	3	6,6,7
	4	4,5,5,5
20	2	10,10
	3	6,7,7
	4	5,5,5,5
	5	4,4,4,4,4

Choosing a RAID Level

There are several issues to consider when choosing the RAID Level for your logical drive. The following discussion summarizes some advantages, disadvantages and applications for each choice.

RAID 0

Advantages	Disadvantages
Implements a striped logical drive, the data is broken down into blocks and each block is written to a separate physical drive I/O performance is greatly improved by spreading the I/O load across many channels and drives No parity calculation overhead is involved	Not a true RAID because it is not fault-tolerant The failure of just one drive will result in all data in an logical drive being lost Should not be used in mission critical environments

Recommended applications for RAID 0:

- Image Editing
- Pre-Press Applications
- Any application requiring high bandwidth

RAID 1

Advantages	Disadvantages
Simplest RAID storage subsystem design Can increase read performance by processing data requests in parallel since the same data resides on two different drives	Very high physical drive overhead – uses only 50% of total capacity

Recommended applications for RAID 1:

- Accounting/Financial
- Payroll
- Any application requiring very high availability

RAID 1E

Advantages	Disadvantages
Implemented as a mirrored logical drive whose segments are RAID 0 logical drives High I/O rates are achieved thanks to multiple stripe segments Can use an odd number of physical drives	Very high physical drive overhead – uses only 50% of total capacity

Recommended Applications for RAID 1E

- Imaging applications
- Database servers
- General fileserver

RAID 5

Advantages	Disadvantages
High Read data transaction rate Medium Write data transaction rate Good aggregate transfer rate Most versatile RAID level	Physical drive failure has a medium impact on throughput

Recommended applications for RAID 5:

- File and Application servers
- WWW, E-mail, and News servers
- Intranet servers

RAID 6

Advantages	Disadvantages
High Read data transaction rate Medium Write data transaction rate Good aggregate transfer rate Safest RAID level	High physical drive overhead – equivalent of two drives used for parity Slightly lower performance than RAID 5

Recommended applications for RAID 6:

- Accounting/Financial
- Database servers
- Any application requiring very high availability

RAID 10

Advantages	Disadvantages
Implemented as a mirrored logical drive whose segments are RAID 0 logical drives High I/O rates are achieved thanks to multiple stripe segments	Very high physical drive overhead – uses only 50% of total capacity

Recommended applications for RAID 10:

- Imaging applications
- Database servers
- General fileserver

RAID 50

Advantages	Disadvantages
High Read data transaction rate Good write data transaction rate Very good aggregate transfer rate Most versatile RAID level	Physical drive failure has a moderate impact on throughput

Recommended applications for RAID 50:

- File and Application Servers
- Transaction Processing
- Office applications with many users accessing small files

RAID 60

Advantages	Disadvantages
High Read data transaction rate Medium Write data transaction rate Good aggregate transfer rate Safest RAID level	High disk overhead – equivalent of two drives used for parity Slightly lower performance than RAID 50

Recommended Applications for RAID 60:

- Accounting and Financial
- Database servers
- Any application requiring very high availability

Choosing Stripe Block Size

You set the stripe block size, also called block size, when you create a logical drive. With SuperTrak, the choices are 64 KB, 128 KB, 256 KB, 512 KB, and 1024 KB. 64 KB is the default.

Your choice will directly affect performance. There are two issues to consider when choosing the stripe block size.

- Choose a stripe block size equal to or smaller than the smallest cache buffer found on any physical drive in your logical drive.

  A larger value slows the logical drive down because physical drives with smaller cache buffers need more time for multiple accesses to fill their buffers.
- If your data retrieval consists of fixed-size data blocks, such as some database and video applications, choose that data block size as your stripe block size.

Generally speaking, email, POS, and webservers prefer smaller stripe block sizes. Video and database applications prefer larger stripe block sizes.

See “Creating a Logical Drive” on page 65 and page 136, and “Creating a Disk Array – Advanced Configuration” on page 132.

Choosing Sector Size

You set the sector size when you create a logical drive. With SuperTrak, the choices are 512 B, 1 KB, 2 KB, and 4 KB. 512 B is the default.

A sector is the smallest addressable area on a physical drive. Sector Size refers to the size of sector measured by the number of bytes of data it can hold. The most common sector size is 512 bytes (512 B). A smaller sector size results in a more efficient use of a physical drive’s capacity. 512 B is the default sector size for logical drives on SuperTrak.

The number of usable sectors is limited by the addressing method of the computer's operating system:

- Windows 2000 and Windows XP (32-bit) support 10-bit logical bit addressing (LBA), so with 512 B sectors, they can only support up to 2 terabytes (TB) of data storage capacity. To increase the capacity, you must use larger sectors. See “2 TB Limitation” on page 173.
- Windows XP (64-bit), Windows 2003 Server, and Windows Vista support 64-bit LBA, so they are not affected by this limitation. For these OSes, always choose the default 512 B sector size.
- Linux operating systems with the 2.4 kernel do not support variable sector sizes. For these OSes, always choose the default 512 B sector size.

- Linux operating systems with the 2.6 kernel support 64-bit LBA. For these OSes, always choose the default 512 B sector size.

See “Creating a Logical Drive” on page 65 and page 136, and “Creating a Disk Array – Advanced Configuration” on page 132.

2 TB Limitation

If your Host PC runs Windows 2000 or Windows XP (32-bit), and you want to create logical drives larger than 2 TB, you must choose a sector size larger than 512 B when you create the logical drive. The table on the next page correlates sector size with logical drive capacity.

Logical Drive Size	Sector Size
8 to 16 TB	4096 bytes (4 KB)
4 to 8 TB	2048 bytes (2 KB)
2 to 4 TB	1024 bytes (1 KB)
0 to 2 TB	512 bytes (512 B)

Also see “Ranges of Disk Array Expansion” on page 182.

Choosing Cache Policy

As it is used with SuperTrak, the term *cache* refers to any of several kinds of high-speed, volatile memory that hold data moving from your computer to the physical drives or vice-versa. Cache is important because it can read and write data much faster than a physical drive. There are read caches, which hold data as it is read from a physical drive; and write caches, which hold data as it is written to a physical drive.

In order to tune the cache for best performance in different applications, user-adjustable settings are provided. Cache settings are made in conjunction with logical drives:

- When you create a logical drive. See “Creating a Logical Drive” on page 65 or page 136, and “Creating a Disk Array – Advanced Configuration” on page 132.
- On an existing logical drive. See “Changing Logical Drive Settings” on page 67 or page 145.

Read Cache Policy

- **Read Cache** – The read cache is enabled.
- **Read Ahead** – The read cache and the read-ahead feature are enabled. Read-ahead anticipates the next read and performs it before the request is made. Can increase read performance.
- **No Cache** – The read cache is disabled.

Write Cache Policy

- **Write Back** – Data is written first to the cache, then to the logical drive. Better performance. VTrak has a cache backup battery to protect data in the cache from a sudden power failure.
- **Write Through** – Data is written to the cache and the logical drive at the same time. Safer.

Capacity Coercion

This feature is designed for fault-tolerant logical drives (RAID 1, 1E, 5, 6, 10, and 50). It is generally recommended to use physical drives of the same size in your disk arrays. When this is not possible, physical drives of different sizes will work but the system must adjust for the size differences by reducing or coercing the capacity of the larger drives to match the smaller ones. With SuperTrak, you can choose to enable Capacity Coercion and any one of four methods.

Enable Capacity Coercion and choose the Method in the Controller Settings menu. See “Making Controller Settings” on page 117. The choices are:

- **GBTruncate** – (Default) Reduces the useful capacity to the nearest 1,000,000,000-byte boundary.
- **10GBTruncate** – Reduces the useful capacity to the nearest 10,000,000,000-byte boundary.
- **GRPRounding** – Uses an algorithm to determine how much to truncate. Results in the maximum amount of usable drive capacity.
- **TableRounding** – Applies a predefined table to determine how much to truncate.

Capacity Coercion also affects a replacement drive used in a disk array. Normally, when an physical drive fails, the replacement drive must be the same capacity or larger. However, the Capacity Coercion feature permits the installation of a replacement drive that is slightly smaller (within 1 gigabyte) than the remaining working drive. For example, the remaining working drives can be 80.5 GB and the replacement drive can be 80.3, since all are rounded down to 80 GB. This permits the smaller drive to be used.

Without Capacity Coercion, the controller will not permit the use of a replacement physical drive that is slightly smaller than the remaining working drive(s).

Initialization

Initialization is highly recommended for logical drives when they are created from a disk array. Initialization sets all data bits in the logical drive to zero. The action is useful because there may be residual data on the logical drives left behind from earlier configurations. You can also perform an Initialization on an existing logical drive.

Warning

When you initialize a logical drive, all the data the logical drive will be lost. Backup any important data before you initialize a logical drive.

There are three options for logical drive initialization:

- **Full** – Overwrites all data bits on the logical drive. Can take some time for larger logical drives
- **Quick** – Overwrites the data bits on the first and last blocks of logical drive. Takes only seconds.
- **None** – Leaves residual data on the logical drives. Not recommended.

See “Creating a Logical Drive” on page 65 and page 136, “Creating a Disk Array – Advanced Configuration” on page 132, and “Initializing a Logical Drive” on page 146.

Hot Spare Drive(s)

A hot spare is a physical drive that is connected to the logical drive system but is not assigned as a member of the logical drive. In the event of the failure of a drive within a functioning fault tolerant logical drive, the hot spare is activated as a member of the logical drive to replace the failed drive.

SuperTrak will replace a failed physical drive in a logical drive with a hot spare drive, if one is available. There are two types of hot spare drive:

- **Global** – An unassigned physical drive available to any logical drive on the Host PC.
- **Dedicated** – An unassigned physical drive that can only be used by a specified logical drive.

There is another property you can assign to a hot spare drive:

- **Revertible** – A revertible spare drive will return to spare status when the failed drive is replace with a new drive. See “Transition” on page 185.

Whenever possible, having a hot spare drive in your RAID system is good protection against physical drive failure.

Partition and Format the Logical Drive

Like any other type of fixed disk media in your system, a RAID logical drive must also be partitioned and formatted before use. Use the same method of partitioning and formatting on an logical drive as you would any other fixed disk.

See “Appendix A: Partition and Format” on page 203.

RAID Level Migration

To *migrate* a disk array is to do one or both:

- Change its RAID level
- Increase the number of physical drives (sometimes called *expansion*)

On SuperTrak, RAID level migration is performed on the disk array but it applies to the logical drives. Migration takes place on an existing Functional disk array without disturbing the existing data. While the disk array is migrating, you can access the data as before. When migration is complete, your disk array will have a different RAID level and/or a larger capacity.

In most cases, you must add one or more physical drives during the migration process. You can never reduce the number of physical drives.

The tables below shows the migration options for a source logical drive according to its RAID level. The available target RAID levels are shown with their requirements.

You must use WebPAM PRO to migrate a disk array. See “Migrating a Disk Array” on page 138.

RAID 0

A RAID 0 source logical drive can migrate to the following target logical drives:

Target	Requirements
RAID 0	Add physical drives.
RAID 1	2 physical drives only. Only a single-drive RAID 0 can migrate to RAID 1 by adding 1 physical drive.
RAID 1E	3 or more physical drives.
RAID 5	3 physical drives minimum, 16 maximum. RAID 0 must have less than 16 physical drives.
RAID 6	4 physical drives minimum, 16 maximum.
RAID 10	4 physical drives minimum. Even number of physical drives.
RAID 50	6 physical drives minimum, 16 per axle maximum.
RAID 60	8 physical drives minimum, 16 per axle maximum.

RAID 1

A RAID 1 Source logical drive can migrate to the following Target logical drives:

Target	Requirements
RAID 0	None.
RAID 1E	3 or more physical drives.
RAID 5	3 physical drives minimum, 16 maximum. RAID 1 must have less than 16 physical drives.
RAID 10	4 physical drives minimum. Even number of physical drives.
RAID 50	6 physical drives minimum, 16 per axle maximum.

RAID 1E

A RAID 1E Source logical drive can migrate to the following Target logical drives:

Target	Requirements
RAID 0	None.
RAID 1E	Add physical drives.
RAID 5	3 physical drives minimum, 16 maximum. RAID 1E must have less than 16 physical drives.
RAID 10	4 physical drives minimum. Even number of physical drives.
RAID 50	6 physical drives minimum, 16 per axle maximum.

RAID 5

A RAID 5 Source logical drive can migrate to the following Target logical drives:

Target	Requirements
RAID 0	None.
RAID 1E	None.
RAID 5	Add physical drives. 16 maximum.
RAID 6	4 physical drives minimum, 16 maximum.
RAID 10	4 physical drives minimum. Even number of physical drives.
RAID 50	6 physical drives minimum, 16 per axle maximum.
RAID 60	8 physical drives minimum, 16 per axle maximum.

RAID 6

A RAID 6 Source logical drive can migrate to the following Target logical drives:

Target	Requirements
RAID 6	Add physical drives. 16 maximum.
RAID 60	8 physical drives minimum, 16 per axle maximum.

RAID 10

A RAID 10 Source logical drive can migrate to the following Target logical drives:

Target	Requirements
RAID 0	None.
RAID 1E	None.
RAID 5	3 physical drives minimum, 16 maximum. RAID 10 must have less than 16 physical drives.
RAID 6	4 physical drives minimum, 16 maximum. RAID 10 must have less than 16 physical drives.
RAID 10	Add physical drives. Even number of physical drives.
RAID 50	6 physical drives minimum, 16 per axle maximum.
RAID 60	8 physical drives minimum, 16 per axle maximum.

RAID 50

A RAID 50 Source logical drive can migrate to the following Target logical drives:

Target	Requirements
RAID 0	None.
RAID 1E	None.
RAID 5	16 physical drives maximum. RAID 50 must have less than 16 physical drives.
RAID 6	16 physical drives maximum. RAID 50 must have less than 16 physical drives.
RAID 10	Even number of physical drives.
RAID 50	Add physical drives. 16 per axle maximum.
RAID 60	8 physical drives minimum, 16 per axle maximum.

RAID 60

A RAID 60 Source logical drive can migrate to the following Target logical drives:

Target	Requirements
RAID 6	16 physical drives maximum. RAID 60 must have less than 16 physical drives.
RAID 60	Add physical drives. 16 per axle maximum.

Important

- The Target disk array may require more physical drives than the Source disk array
- If the Target disk array requires an EVEN number of physical drives but the Source disk array has an ODD number, ADD a physical drive as part of the migration process
- You cannot reduce the number of physical drives in your disk array, even if the Target disk array requires fewer physical drives than the Source disk array
- RAID 1 (mirroring) works with two drives only. Only a single-drive RAID 0 disk array can migrate to RAID 1. Other RAID Levels use too many drives to migrate
- You cannot migrate a disk array when it is Critical or performing activities such as Synchronizing, Rebuilding, and PDM
- For RAID 6 or RAID 60, you can only migrate between these two RAID levels. Destination RAID 60 axles can have up to 16 physical drives. Other limitations might apply

Ranges of Disk Array Expansion

The Windows 2000 and Windows XP (32-bit) operating systems support a 10-byte LBA format. As a result, these OSes can only recognize 4 billion addresses. If you create a logical drive using the default 512 B sector size, the logical drive will be limited to 2 TB of data, even if there is more space available on your physical drives.

This limitation does not apply to Windows XP (64-bit), 2003 Server, Vista, and Linux OSes with the 2.6 kernel. Linux OSes with the 2.4 kernel do not support variable sector sizes, therefore you cannot apply the solution described here to those OSes.

Note that once you create your logical drive, you cannot change the size of the sectors. Nor can you increase the number of address blocks that the OS recognizes.

You can direct WebPAM PRO to expand a logical drive beyond the maximum expansion size. When the expansion is finished:

- WebPAM PRO will show the logical drive in the desired size.
- Your operating system might show the logical drive at the maximum size listed in the table below.
- Additional capacity might appear as unpartitioned and unformatted.

Current LD Size	Maximum LD Expansion Size	Sector Size
8 to 16 TB	16 TB	4096 bytes
4 to 8 TB	8 TB	2048 bytes
2 to 4 TB	4 TB	1024 bytes
up to 2 TB	2 TB	512 bytes

At this point, you have the choice of:

- Format the unpartitioned/unformatted capacity as a *second* logical drive
- Delete the existing disk array and create a new one in the desired size

Delete and Recreate

If you require a logical drive larger than the maximum expansion size:

1. Backup the data from the current logical drive.
2. Delete the current logical drive.
   See “Deleting a Logical Drive” on page 67 or page 137.
3. Create a new logical drive with the desired capacity.
   See “Creating a Logical Drive” on page 65 or page 136.
4. Restore the data to the new logical drive.

Media Patrol

Media Patrol is a routine maintenance procedure that checks the magnetic media on each physical drive. Media Patrol checks all physical drives assigned to disk arrays and on spare drives. Media Patrol does not check unconfigured drives.

Unlike Synchronization and Redundancy Check, Media Patrol is concerned with the condition of the media itself, not the data recorded on the media. If Media Patrol encounters a critical error, it triggers PDM if PDM is enabled.

You can run Media Patrol from the subsystem. See “Running Media Patrol” on page 110.

You can also run Media Patrol on a disk array. See “Running Media Patrol on a Disk Array” on page 140.

Predictive Data Migration (PDM)

Predictive Data Migration (PDM) is the migration of data from the suspect physical drive to a spare drive, similar to Rebuilding a Logical Drive. But unlike Rebuilding, PDM constantly monitors your physical drives and automatically copies your data to the spare drive *before* the suspect drive fails and your Logical Drive goes Critical. See “Running PDM” on page 110 and “Running PDM on a Disk Array” on page 140.

After the data is copied from the suspect drive, the controller marks the suspect drive with a Stale configuration and a PFA error.

You can clear the Stale configuration and PFA error and put the physical drive back into service. See “Clearing Stale and PFA Conditions” on page 125. In some cases, however, you might remove the physical drive for repair or replacement.

PDM Triggers

The following actions trigger PDM:

- A physical drive with unhealthy status (see below)
- Media Patrol finds a disk critical error*
- You initiate PDM manually

*PDM also counts the number of media errors reported by Media Patrol.

A physical drive becomes unhealthy when:

- A SMART error is reported
- The bad sector remapping table fills to the specified level

Because data would be lost if written to a bad sector, when a bad sector is detected, the physical drive creates a map around it. These maps are saved in

the bad sector remapping table, which has a capacity of 512 reassigned blocks and 1024 error blocks.

When the table fills to a specified percentage of its capacity, PDM triggers a migration of data from the suspect drive (the physical drive with the bad sectors) to a spare drive.

During data migration, you will have access to the logical drive but it will respond more slowly to read/write tasks because of the additional operation. The time required for data migration depends on the size of the physical drive.

See “Making Background Activity Settings” on page 109.

Transition

The Transition feature enables you to specify “permanent” spare drives for your SuperTrak controller. Transition is the process of replacing a revertible spare drive that is currently part of a disk array with an unconfigured physical drive or a non-revertible spare. The revertible spare drive returns to its original status.

Transition happens automatically when the following sequence of events takes place:

- You create a revertible spare drive. “Creating a Spare Drive” on page 150
- One of the physical drives assigned to your disk array fails and the array becomes degraded and the logical drive goes critical.
- The SuperTrak controller automatically rebuilds your array to the revertible spare drive and the array becomes functional again.
- You replace the failed physical drive with a new physical drive of equal or greater capacity.
- The SuperTrak controller automatically transitions (moves) the data from the revertible spare to the new physical drive.
- The new physical drive becomes part of the array and the revertible spare drive returns to its original spare status.

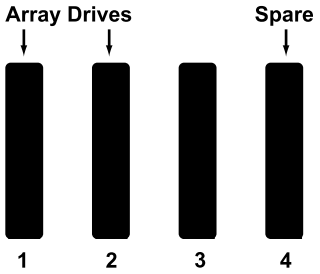
Transition happens manually when you specify a different unconfigured physical drive to transition (move) the data from the revertible spare drive.

Drive Failure and Automatic Rebuild

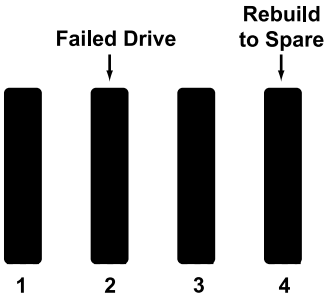
In the example below, there is a two-drive RAID 1 disk array.

- The physical drives in channels 1 and 2 belong to the disk array.
- The physical drive in channel 3 is unconfigured.

- The physical drive in channel 4 is a revertible spare drive.



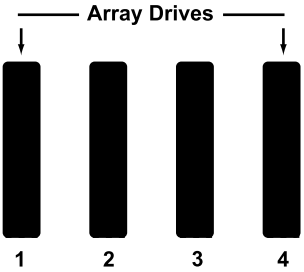
The physical drive in channel 2 fails. The disk array becomes degraded and its logical drives go critical. The SuperTrak controller automatically rebuilds the disk array using the revertible spare drive, the physical drive in channel 4.



When the rebuild is finished, the disk array and logical drives are OK again.

- The physical drives in channels 1 and 4 belong to the disk array.
- The physical drive in channel 2 has failed and is unusable.
- The physical drive in channel 3 is unconfigured.

Note that there is no spare drive at this moment.



Automatic Transition

At this juncture, you would replace the failed drive in channel 2 with a new drive of the same or greater capacity.

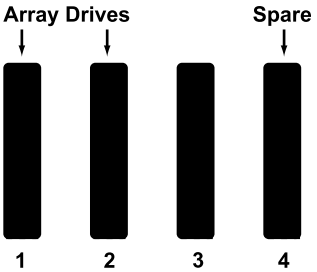
When the SuperTrak controller detects the new drive in channel 2, it will:

- Transition the data from the drive in channel 4 to the drive in channel 2.
- Return the drive in channel 4 to spare status.

When the Transition is finished:

- The physical drives in channels 1 and 2 belong to the disk array.
- The physical drive in channel 3 is still unconfigured.
- The physical drive in channel 4 is a revertible spare drive.

The original configuration is restored.

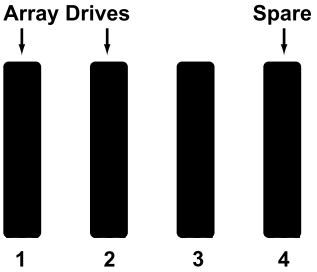


Manual Transition

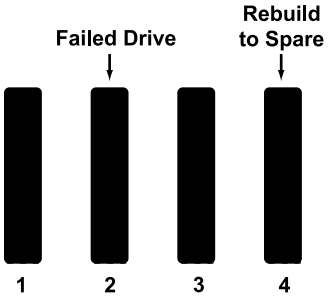
Manual transition requires an unassigned physical drive.

The example below is the same two-drive RAID 1 disk array as before.

- The physical drives in channels 1 and 2 belong to the disk array.
- The physical drive in channel 3 is unconfigured.
- The physical drive in channel 4 is a revertible spare drive.



The physical drive in channel 2 fails. The disk array becomes degraded and its logical drives go critical. The SuperTrak controller automatically rebuilds the disk array using the spare drive, the physical drive in channel 4.

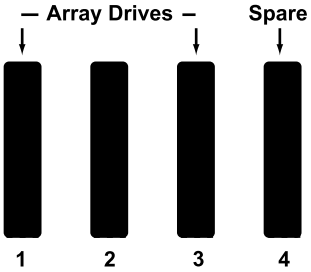


As we saw in the example of Automatic Transition, if you replace the failed physical drive in channel 2, the SuperTrak controller would transition the data from the physical drive in channel 4 to the new drive in channel 2.

But if you wanted to use a *different* physical drive in your array, such as the unassigned drive in channel 3, you would run the Transition function *manually*.

When the Manual Transition is finished:

- The physical drives in channels 1 and 3 belong to the disk array.
- The physical drive channel 2 is still failed and unusable.
- The physical drive in channel 4 is a revertible spare drive.



At this point, after running the Manual Transition, you would replace the failed drive in channel 2. The replacement drive in channel 2 will remain unconfigured until you assign it to a disk array or as a spare.

Critical & Offline Logical Drives

A fault-tolerant logical drive—RAID 1, 1E, 5, 6, 10, 50, or 60—goes *critical* when a physical drive is removed or fails. Due to the fault tolerance of the logical drive, the data is still available and online. However, once the logical drive goes critical, the logical drive has lost its fault tolerance, and performance may be adversely affected.

If the fault was caused by a failed drive that was removed, the drive must be replaced by another drive, either identical or larger, in order for the RAID system to rebuild and restore optimal configuration.

If your fault-tolerant logical drive—RAID 1, 1E, 5, 6, 10, 50, or 60—goes *offline*, contact Technical Support. See page 197.

Warning

Take no further corrective action until you have consulted with Technical Support. See page 197.

A non-fault tolerant logical drive—RAID 0—goes *offline* when a physical drive is removed or fails. Since the logical drive is not fault tolerant, the data stored in the logical drive is no longer accessible.

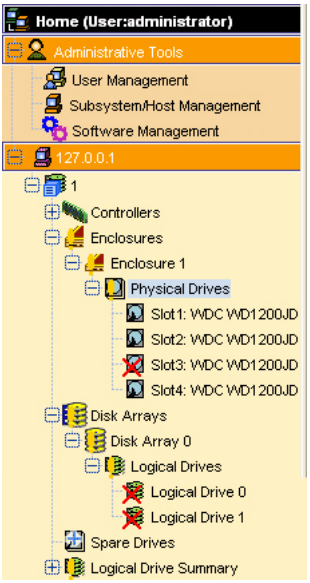
If one physical drive fails, all of the data on the logical drive is lost. You must replace the failed drive. Then, if the logical drive had more than one physical drive, delete the logical drive and re-create it. Restore the data from a backup source.

When a Physical Drive Fails

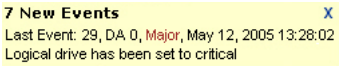
The SuperTrak EX Controller provides both audible and visual indicators to alert you of a physical drive failure. The following will occur when a physical drive fails or goes offline, WebPAM PRO reports the condition.

WebPAM PRO aids in troubleshooting your logical drives and enclosure by continuous monitoring and reporting to the User in the following ways:

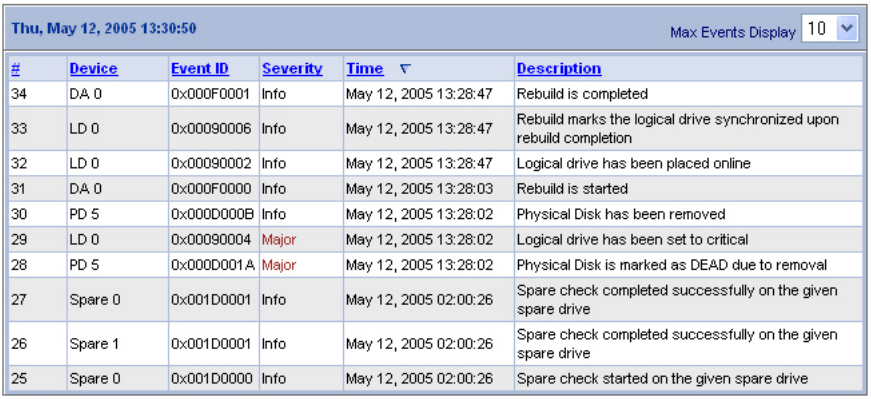
- Displays yellow !s ❗ red Xs ❌ in Tree View (below)



- Sends email messages, per your configuration
- Displays popup messages, per your configuration (below)



- Keeps a record in the Event Log (below)



#	Device	Event ID	Severity	Time	Description
34	DA 0	0x000F0001	Info	May 12, 2005 13:28:47	Rebuild is completed
33	LD 0	0x00090006	Info	May 12, 2005 13:28:47	Rebuild marks the logical drive synchronized upon rebuild completion
32	LD 0	0x00090002	Info	May 12, 2005 13:28:47	Logical drive has been placed online
31	DA 0	0x000F0000	Info	May 12, 2005 13:28:03	Rebuild is started
30	PD 5	0x000D000B	Info	May 12, 2005 13:28:02	Physical Disk has been removed
29	LD 0	0x00090004	Major	May 12, 2005 13:28:02	Logical drive has been set to critical
28	PD 5	0x000D001A	Major	May 12, 2005 13:28:02	Physical Disk is marked as DEAD due to removal
27	Spare 0	0x001D0001	Info	May 12, 2005 02:00:26	Spare check completed successfully on the given spare drive
26	Spare 1	0x001D0001	Info	May 12, 2005 02:00:26	Spare check completed successfully on the given spare drive
25	Spare 0	0x001D0000	Info	May 12, 2005 02:00:26	Spare check started on the given spare drive

With a Hot Spare Drive

When a physical drive in a disk array fails and a spare drive of adequate capacity is available, the disk array will begin to rebuild automatically using the spare drive.

After the disk array rebuilds itself using the spare drive, you must replace the failed drive.

To set up a spare drive, see “Creating a Spare Drive” on page 150.

Without a Hot Spare Drive

If there is no hot spare drive of adequate capacity, you must remove the failed drive and install an unconfigured replacement drive of the same or greater capacity in the same slot as the failed drive. Until you install the replacement drive, the logical drive will remain Degraded.

- If the Auto Rebuild function is ENABLED, the disk array will begin to rebuild automatically as soon as you replace the failed drive.
- If the Auto Rebuild function is DISABLED, you must manually rebuild the disk array after you replace the failed drive.

To enable Automatic Rebuild, see “Making Background Activity Settings” on page 109.

To set Hot Spare Policy, see “Making Spare Drive Settings” on page 151.

Important

If your replacement physical drive was formerly part of a different disk array or logical drive, you must clear the configuration data on the replacement drive before you use it.

See “Clearing Stale and PFA Conditions” on page 125.

Rebuild Operation

During rebuild:

- The alarm sounds two short beeps, repeated
- No warning icon displays over the disk array or logical drive icons

  Management View reports the disk array’s Operational Status as OK, Rebuilding.

During rebuilding, you can still read and write data to the logical drive. However, fault tolerance is lost until the disk array returns to OK (not-rebuilding) status.

After a successful rebuild:

- The alarm is silent
- The logical drive's Operational Status as OK
- The rebuilt physical drive Status LED displays steady green

Chapter 7: Support

- Frequently Asked Questions (below)
- Contacting Technical Support (page 197)
- Limited Warranty (page 199)
- Returning the Product For Repair (page 201)

Frequently Asked Questions

This section lists frequently asked questions involving pre-installation, drive issues, installation, and post-installation.

Pre-Installation (Speed, Device Types, Capacity, Cabling)

What kind of HDDs can I use for a SuperTrak EX Series logical drive?

You can use any Serial Attached SCSI (SAS) Serial ATA (SATA) hard drives to create arrays on the SuperTrak EX Series. Use matching drives for multiple-drive arrays to maximize capacity usage as well as performance.

What is the maximum physical drive storage capacity of SuperTrak EX Series?

The SuperTrak EX4650 and EX4650A support up to 3.0 TB (four 750 GB physical drives).

The SuperTrak EX8650 and EX8650A support up to 6.0 TB (eight 750 GB physical drives).

The SuperTrak EX Series controllers also support up to 128 SAS physical drives per SAS port using SAS expanders.

How can I change the resources that the SuperTrak uses?

The SuperTrak EX Series Controllers are fully PnP. This means all the resources that it uses are given to it by the PnP BIOS on the motherboard.

The SuperTrak Series Controller supports IRQ sharing, but this feature only works when ALL the concerned devices support it. If your motherboard allows you to control the assignment of these resources, you may be able to remedy the problem by:

- Changing the IRQ assignments to the PCI slots in the motherboard BIOS during boot up.
- Reset the configuration data in your CMOS. This is usually an option in the PnP section of your CMOS.
- Otherwise, switch the SuperTrak Controller card to a different PCI slot.

Can I use ATAPI devices on the SuperTrak EX Series?

No. The SuperTrak EX Series Controller does not support ATAPI devices.

Will ACPI work with HDDs on the SuperTrak EX Series?

Yes. The SuperTrak EX Series controller supports ACPI S1, S3 and S4 standby modes.

What kind of PCI slots do the SuperTrak EX Series controllers use?

SuperTrak EX Series controllers will work in a PCI-Express x8 slot or x16 slot.

Drive Issues

Can I add a drive to a SuperTrak EX Series logical drive via hot-swap and dynamically adjust the array size/configuration?

Yes. The SuperTrak EX Series controller supports online logical drive expansion and migration. You must use the SuperBuild utility or the WebPAM PRO software to expand or migrate an existing logical drive.

Do the HDDs on the SuperTrak EX Series have to be the same size?

The physical drives that you use with the SuperTrak EX Series controller do not have to be the same size. If the sizes differ, the SuperTrak EX Controller will truncate the large drive so the capacities match. The resulting difference in drive space is unusable, so avoid using physical drives of significantly different capacities.

Can I take a drive used in a SuperTrak EX Series logical drive and access it directly with a different controller, such as the one integrated on the motherboard?

Yes, but only under certain configurations. First, the other controller must address the drives as LBA, not CHS.

Second, only the following configurations allow the drive(s) to be accessed individually on another controller:

- Single-drive RAID 0 (stripe)
- One drive from a RAID 1 (mirror) logical drive

No other array configurations will work for this purpose.

I already have an array on a Promise FastTrak controller. Can I move that array to my new SuperTrak EX Series controller?

No. The SuperTrak EX Series controller supports SNIA Disk Data Format (DDF), which is not backward compatible with the FastTrak controller.

If I have a problem with one of the drives on the SuperTrak EX Series, how can I low-level format it to correct the problem?

Do NOT do this! Low-level formatting hard physical drives is not only unnecessary but it generally does not correct problems commonly experienced during use.

Errors such as bad sectors or ECC/CRC failure are best remedied by completely replacing the drive. For this reason, do NOT low-level format the drives attached to the SuperTrak EX Series controller.

Do I have to install disk management software on my logical drive in order to access the full storage capacity of drives?

No! Disk management software will only complicate things. The logical drive should be fully addressable by your OS as it is. Some operating systems have limits on the sizes of partitions and logical drives that can be defined. Consult your OS documentation about partitioning larger drives.

What system BIOS setup settings do I use for the drives on the SuperTrak EX Series?

A BIOS setting is required only if you want to boot your system from the logical drive on the SuperTrak EX Series controller. After your logical drive is created, partitioned and formatted, make the change in your BIOS boot order setting.

How do I partition/format my SuperTrak EX Series RAID logical drive?

The SuperTrak EX Series controller represents the logical drive as a single physical drive to your system. Therefore, anything that you can do to a single physical drive you can do to a SuperTrak logical drive.

For example, you should use the FDISK and FORMAT utilities to partition and format the logical drive. You can format the logical drive with any file system you wish.

Installation Issues (Capacity, Booting)

How can I change the system boot sequence in order to boot from the SuperTrak EX Series logical drive?

The boot sequence is controlled by the system BIOS. As far as the system BIOS is concerned, the SuperTrak EX Controller and defined logical drives are categorized as a SCSI device. This allows you to set the boot sequence in your BIOS setup utility to boot from SCSI first, rather than IDE.

If there are multiple SCSI add-in controllers in the system, then the boot sequence among them will be determined exclusively by their PCI slot priority. PCI slot #1 will be first, slot #2 second, etc. Put the SuperTrak EX Controller in the PCI-Express slot where it will be accessed ahead of other SCSI controllers if you want to boot from the logical drive.

How can I change the boot sequence between a PCI SCSI card and the SuperTrak EX Series RAID logical drive?

Since all PCI-Express are PnP, it is difficult to determine which device is addressed first. Most motherboard BIOSes have advanced options that identify devices and allow you to choose which device will be assigned resources first. Otherwise you may have to physically switch the device cards on the PCI/PCI-Express/PCI-X slots so that the boot device is in the highest priority slot number (see previous question).

Post-Installation

Why can't I see the drives on the SuperTrak EX Series under FDISK?

You have not created a logical drive yet. Without a logical drive, the system will not recognize the physical drives attached to the SuperTrak EX Controller.

A physical drive is recognized by the SuperTrak controller but not available to use in a disk array. How can I make it available?

The physical drive might contain obsolete disk array information. See "Clearing Stale and PFA Conditions" on page 125. This action clears the obsolete information in order to make the drive available.

Why can't I make a dedicated spare drive in WebPAM PRO?

Early versions of Internet Explorer running in Windows 2000 exhibit this problem. Update your Internet Explorer to the latest version.

Why can't I run WebPAM PRO in Konqueror?

The Konqueror browser (Linux) does not support WebPAM PRO. Install a Netscape Navigator or Firefox browser. With that browser as the default, reinstall WebPAM PRO.

Aren't the WebPAM PRO icons supposed to be animated?

Yes, they are animated. However, the default setting for Internet Explorer under Windows 2003 Server does not display animation in the browser. Go to Internet Options > Advanced and check *Play animations in web pages*.

Contacting Technical Support

Promise Technical Support provides several support options for Promise users to access information and updates. We encourage you to use one of our electronic services, which provide product information updates for the most efficient service and support.

If you decide to contact us, please have the following information available:

- Product model and serial number
- BIOS and driver version numbers
- A description of the problem / situation
- System configuration information, including: motherboard and CPU type, hard drive model(s), SAS/SATA/ATA/ATAPI drives & devices, and other controllers.

Technical Support Services

Promise Online™ Web Site	http://www.promise.com/support (technical documents, drivers, utilities, etc.)

United States

E-mail Support	e-Support On-Line
Fax Support	(408) 228-1097 Attn: Technical Support
Phone Support	(408) 228-1400 option 4
If you wish to write us for support:	Promise Technology, Inc. 580 Cottonwood Drive Milpitas, CA 95035, USA

The Netherlands

E-mail Support	e-Support On-Line
Fax Support	+31 (0) 40 256 9463 Attn: Technical Support
Phone Support	+31 (0) 40 235 2600
If you wish to write us for support:	Promise Technology Europe B.V. Science Park Eindhoven 5542 5692 EL Son, The Netherlands

Germany

E-mail Support	e-Support On-Line
Fax Technical Support	+49 (0) 2 31 56 76 48 - 29 Attn: Technical Support
Phone Technical Support	+49 (0) 2 31 56 76 48 - 10
If you wish to write us for support:	Promise Technology Germany Europaplatz 9 44269 Dortmund, Germany

Italy

E-mail Support	e-Support On-Line
Fax Support	0039 06 367 12400 Attn: Technical Support
Phone Support	0039 06 367 12626
If you wish to write us for support:	Promise Technology Italy Piazza del Popolo 18 00187 Roma, Italia

Taiwan

E-mail Support	e-Support On-Line
Fax Support	+886 3 578 2390 Attn: Technical Support
Phone Support	+886 3 578 2395 (ext. 8811)
If you wish to write us for support:	Promise Technology, Inc. 2F, No. 30, Industry E. Rd. IX Science-based Industrial Park Hsin-Chu 30075, Taiwan (R.O.C.)

China

E-mail Support	e-Support On-Line
Fax Support	+86-10-8857-8015 Attn: Technical Support
Phone Support	+86-10-8857-8085/8095
If you wish to write us for support:	Promise Technology China Room 1205, Tower C Webok Time Center, No.17 South Zhong Guan Cun Street Hai Dian District, Beijing 100081, China

Limited Warranty

Promise Technology, Inc. (“Promise”) warrants that for three (3) years from the time of the delivery of the product to the original end user:

a) the product will conform to Promise’s specifications;

b) the product will be free from defects in material and workmanship under normal use and service.

This warranty:

a) applies only to products which are new and in cartons on the date of purchase;

b) is not transferable;

c) is valid only when accompanied by a copy of the original purchase invoice.

d) Is not valid on spare parts, fans, and power supplies

This warranty shall not apply to defects resulting from:

a) improper or inadequate maintenance, or unauthorized modification(s), performed by the end user;

b) operation outside the environmental specifications for the product;

c) accident, misuse, negligence, misapplication, abuse, natural or personal disaster, or maintenance by anyone other than a Promise or a Promise-authorized service center.

Disclaimer of other warranties

This warranty covers only parts and labor, and excludes coverage on software items as expressly set above.

Except as expressly set forth above, Promise DISCLAIMS any warranties, expressed or implied, by statute or otherwise, regarding the product, including, without limitation, any warranties for fitness for any purpose, quality, merchantability, non-infringement, or otherwise. Promise makes no warranty or representation concerning the suitability of any product for use with any other item. You assume full responsibility for selecting products and for ensuring that the products selected are compatible and appropriate for use with other goods with which they will be used.

Promise DOES NOT WARRANT that any product is free from errors or that it will interface without problems with your computer system. It is your responsibility to back up or otherwise save important data before installing any product and continue to back up your important data regularly.

No other document, statement or representation may be relied on to vary the terms of this limited warranty.

Promise's sole responsibility with respect to any product is to do one of the following:

a) replace the product with a conforming unit of the same or superior product;

b) repair the product.

Promise shall not be liable for the cost of procuring substitute goods, services, lost profits, unrealized savings, equipment damage, costs of recovering, reprogramming, or reproducing of programs or data stored in or used with the products, or for any other general, special, consequential, indirect, incidental, or punitive damages, whether in contract, tort, or otherwise, notwithstanding the failure of the essential purpose of the foregoing remedy and regardless of whether Promise has been advised of the possibility of such damages. Promise is not an insurer. If you desire insurance against such damage, you must obtain insurance from another party.

Some states do not allow the exclusion or limitation of incidental or consequential damages for consumer products, so the above limitation may not apply to you.

This warranty gives specific legal rights, and you may also have other rights that vary from state to state. This limited warranty is governed by the State of California.

Your Responsibilities

You are responsible for determining whether the product is appropriate for your use and will interface with your equipment without malfunction or damage. You are also responsible for backing up your data before installing any product and for regularly backing up your data after installing the product. Promise is not liable for any damage to equipment or data loss resulting from the use of any product.

Returning the Product For Repair

If you suspect a product is not working properly, or if you have any questions about your product, contact our Technical Support Staff through one of our Technical Services, making sure to provide the following information:

- Product model and serial number (required)
- Return shipping address
- Daytime phone number
- Description of the problem
- Copy of the original purchase invoice

The technician will assist you in determining whether the product requires repair. If the product needs repair, the Technical Support Department will issue an RMA (Return Merchandise Authorization) number.

Important

Obtain an RMA number from Technical Support *before* you return the product and write the RMA number on the label. The RMA number is essential for tracking your product and providing the proper service.

Return ONLY the specific product covered by the warranty (do not ship cables, manuals, diskettes, etc.), with a copy of your proof of purchase to:

USA and Canada:	Promise Technology, Inc. Customer Service Dept. Attn.: RMA # _____ 47654 Kato Road Fremont, CA 94538
Other Countries:	Return the product to your dealer or retailer. Contact them for instructions before shipping the product.

You must follow the packaging guidelines for returning products:

- Use the original shipping carton and packaging
- Include a summary of the product's problem(s)
- Write an attention line on the box with the RMA number
- Include a copy of proof of purchase

You are responsible for the cost of insurance and shipment of the product to Promise. Note that damage incurred due to improper transport or packaging is not covered under the Limited Warranty.

When repairing returned product(s), Promise may replace defective parts with new or reconditioned parts, or replace the entire unit with a new or reconditioned unit. In the event of a replacement, the replacement unit will be under warranty for the remainder of the original warranty term from purchase date, or 30 days, whichever is longer.

Promise will pay for standard return shipping charges only. You will be required to pay for any additional shipping options (such as express shipping).

Appendix A: Partition and Format

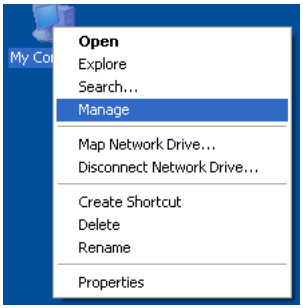
In order for your operating system to recognize and work with the physical drives attached to your SuperTrak EX Controller card, the drives must be partitioned and formatted.

- If your drives were previously partitioned and formatted they are ready to use and you can skip this procedure
- If your drives have not been partitioned and formatted, you must do that job before you can use them

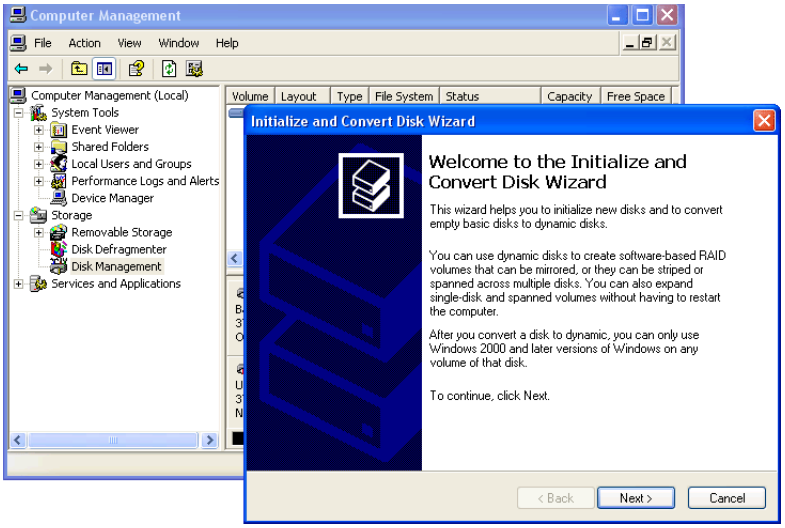
The actions of partitioning and formatting create a file structure on the physical drives with which your operating system can work. In the example below, we show how this is done in Windows. A similar procedure is required for Linux PCs. However, partitioning and formatting in Linux is not automated, therefore please refer to your system documentation for the exact procedure.

Note

If you plan to boot your computer from this logical drive, you will perform partitioning and formatting during the OS installation. The instructions here are for data logical drives only.



1. From the desktop, right-click the **My Computer** icon and choose *Manage* from the popup menu. The Computer Management window opens.
2. From the left menu, click **Disk Management**. The Disk Management window opens with your new logical disk identified as Disk 1. The Initialize Wizard appears automatically.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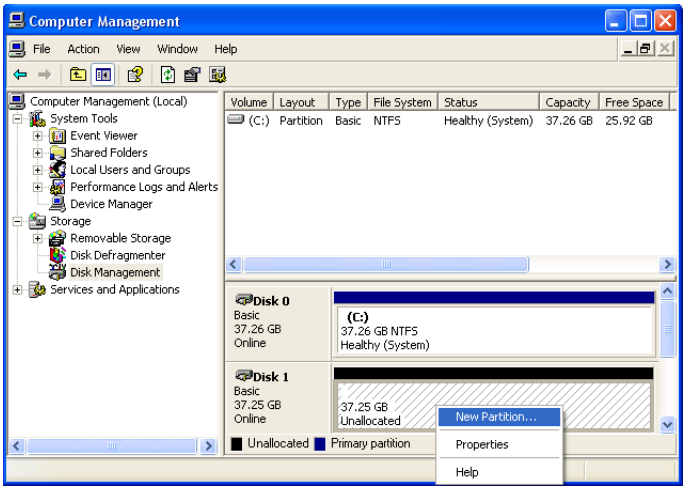
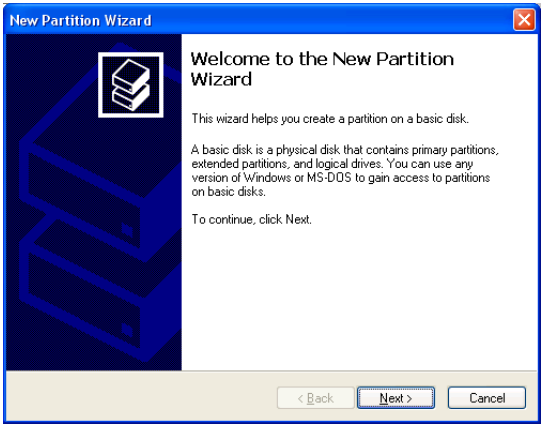
File Action View Window Help
Computer Management (Local)
System Tools
Event Viewer
Shared Folders
Local Users and Groups
Performance Logs and Alerts
Device Manager
Storage
Removable Storage
Disk Defragmenter
Disk Management
Services and Applications
Volume Layout Type File System Status Capacity Free Space
Initialize and Convert Disk Wizard
Welcome to the Initialize and Convert Disk Wizard
This wizard helps you to initialize new disks and to convert empty basic disks to dynamic disks.
You can use dynamic disks to create software-based RAID volumes that can be mirrored, or they can be striped or spanned across multiple disks. You can also expand single-disk and spanned volumes without having to restart the computer.
After you convert a disk to dynamic, you can only use Windows 2000 and later versions of Windows on any volume of that disk.
To continue, click Next.
< Back
Next >
Cancel

3. Click the **Next** button to start the Wizard.
4. In the following windows, choose Disk 1 to Initialize. Do not choose any disks to Convert. Click the **Finish** button to Initialize the logical disk.

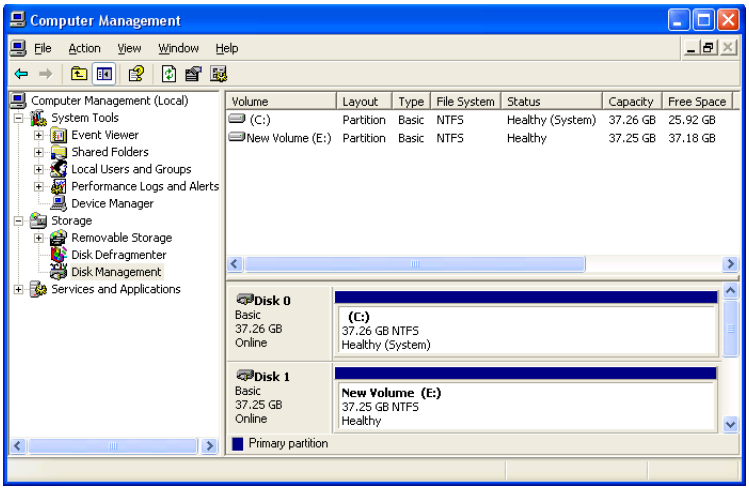


5. Right-click the **Unallocated** portion of Disk 1 and choose *New Partition...* from the popup menu. The New Partition Wizard appears.

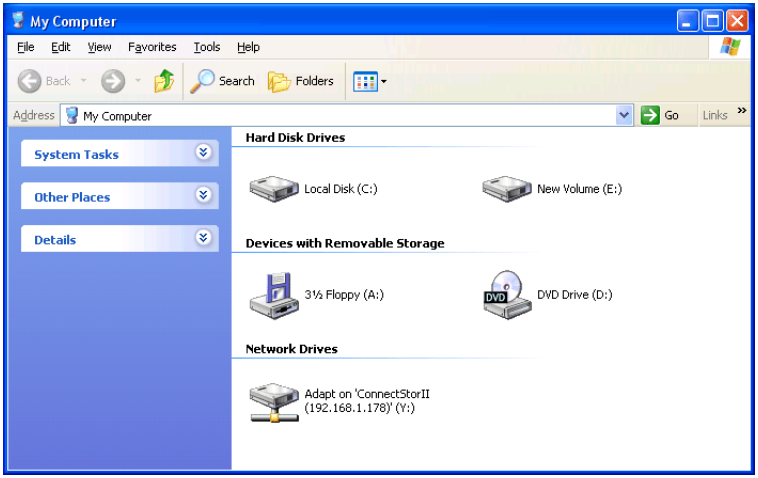

New Partition Wizard
Welcome to the New Partition Wizard
This wizard helps you create a partition on a basic disk.
A basic disk is a physical disk that contains primary partitions, extended partitions, and logical drives. You can use any version of Windows or MS-DOS to gain access to partitions on basic disks.
To continue, click Next.
< Back
Next >
Cancel

6. Click the **Next** button to start the wizard.
7. In the following windows, do the following actions. Click **Next** to move to the next window.
   - Choose Primary Partition
   - Specify the maximum available partition size in MB
   - Assign the available drive letter of your choice
   - Choose Format this partition with the following settings
   - File system: NTFS
   - Allocation unit size: Default
   - Volume label: Enter your choice of name
   - Do not check “Perform a quick format” or “Enable file and folder compression”
8. Review your selections and click **Finish**. The New Partition Wizard will disappear while partitioning and formatting begin.

   This process will take some time. The Disk Management window displays the progress.



When formatting is complete, your logical disk will appear as a hard drive in the Disk Management window (above) and the My Computer window (below).



Appendix B: Upgrades

- Updating SuperTrak BIOS and Firmware (page 207)
- Updating WebPAM PRO (page 208)

Updating SuperTrak BIOS and Firmware

Follow this procedure to upgrade the BIOS and Firmware on your SuperTrak EX4650, EX4650A, EX8650, or EX8650A Controller card.

The SuperTrak card must be properly installed in your PC or server in order to perform the update. See “Installing the SuperTrak Card” on page 8 for more information.

Downloading BIOS and Firmware File

1. Go to the Promise website http://www.promise.com/support.
2. Click *Downloads*.
3. Click the Select Product popup menu and choose *SuperTrak EX4350/ EX4650A/EX8650/EX8650A*.
4. Click the Select Category popup menu and choose *All*.
5. Click the **GO** button.

   The list of available downloads displays. The firmware and BIOS come together in a single package.
6. Click the package you want. Be sure you choose the latest version.
7. In the File Download dialog box, click the **Save** button.
8. In the Save As dialog box, direct the file to save to a convenient location on your PC.
9. Continue the update procedure in WebPAM PRO. See “Updating the Firmware” on page 105.

Important

After you update your BIOS and Firmware, install the latest SuperTrak driver for your OS. See “Chapter 3: Installing Drivers” on page 41.

Updating WebPAM PRO

Follow this procedure to upgrade the WebPAM PRO Software on your PC or server.

Downloading the WebPAM PRO Update File

1. Go to the Promise website http://www.promise.com/support.
2. Click *Downloads*.
3. Click the Select Product popup menu and choose *SuperTrak EX4350/ EX4650A/EX8650/EX8650A*.
4. Click the Select Category popup menu and choose *Utility*.
5. Click the **GO** button.

   The list of the current WebPAM PRO software displays. Promise provides versions of WebPAM PRO software for Windows, Linux, and FreeBSD. Be sure you choose the latest version.
6. Click the WebPAM PRO file you want.
7. In the File Download dialog box, click the **Save** button.
8. In the Save As dialog box, direct the software to save to a convenient location on your PC.
9. Unzip the downloaded WebPAM package.

   The result is a single installer file.

Installing the WebPAM PRO Update File

For the Windows OS, you can install the new version of WebPAM PRO over an existing installation. See “Installing WebPAM PRO onto a Windows PC or Server” on page 22.

For the Linux OS, you must remove the existing version of WebPAM PRO before installing the new one. See “Installing WebPAM PRO onto a Linux PC or Server” on page 29.

Logging into WebPAM PRO

The new version of WebPAM PRO has the same login procedure as previous version. See “Logging into WebPAM PRO” on page 37 or page 83.

Appendix C: Battery Backup Unit

The Battery Backup Unit (BBU) maintains power to the cache on the SuperTrak EX Controller card, when a power failure occurs to the Host PC. The failure could be due to a problem with the PC's power supply, a cessation of electrical service, or an accidental disconnection of the power cable.

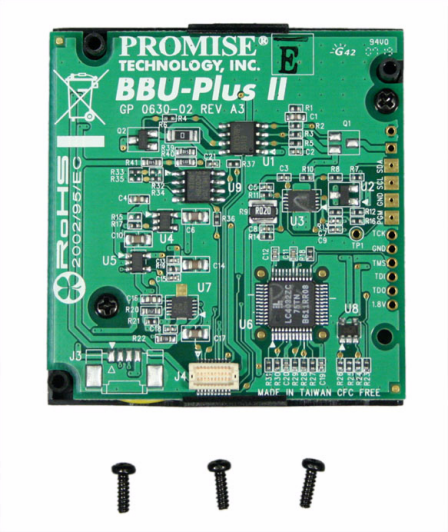
When power is interrupted, any data in the controller's cache is lost. The BBU maintains power to the cache so that any data stored there is saved until it can be written to a physical drive.

The BBU is available as a kit, sold separately from the SuperTrak EX Controller card.

The BBU kit includes the following components:

- Battery Assembly – Includes a lithium battery and holder
- Mounting screws (3)

Figure 1. BBU kit



Installing the BBU

Warning

The electronic components on the SuperTrak EX Controller cards are sensitive to damage from Electro-Static Discharge (ESD). Observe appropriate precautions at all times when handling the SuperTrak card or its subassemblies.

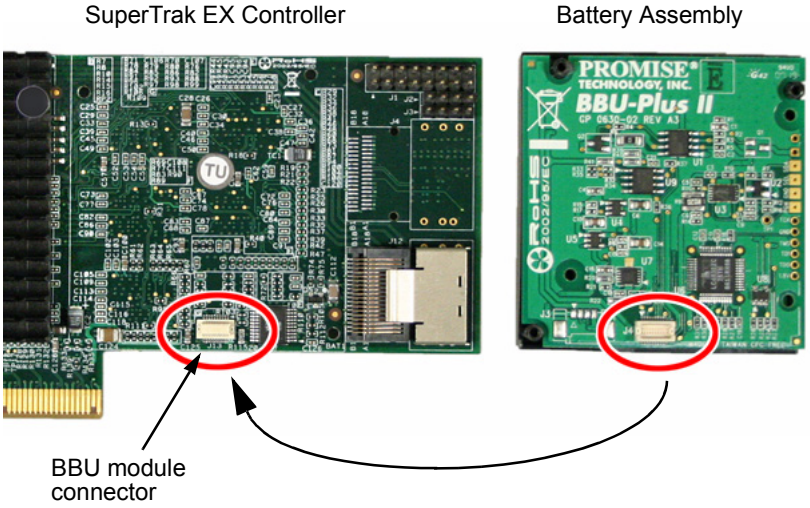
Warning

Before installing the BBU onto SuperTrak EX Controller card, backup any important or useful data. Failure to follow this accepted PC practice could result in data loss.

To install the BBU onto your SuperTrak EX Controller card in the Host PC:

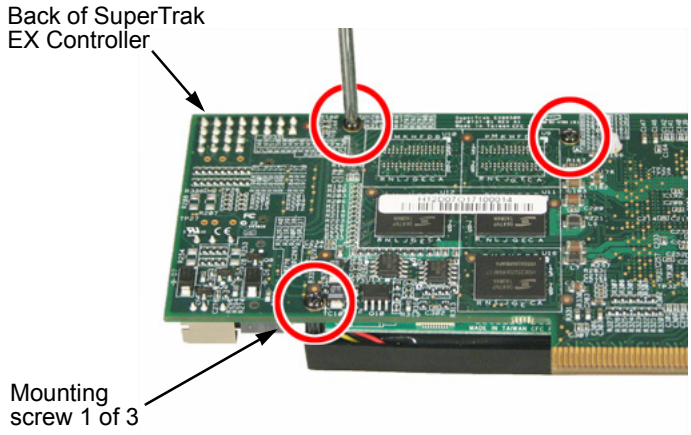
1. Power down your system.
2. Remove the cover of your system.
3. Detach the SAS multi-lane cables from the SuperTrak EX Controller card.
4. Remove the screw holding the SuperTrak EX Controller card to the system case.
5. Gently pull the SuperTrak EX Controller card out of the PCI-Express slot and remove it from the system.
6. Place the SuperTrak EX Controller card on an anti-static surface with the connectors facing up.
7. Attach the BBU module connector on the Battery Assembly to the BBU module connector on the SuperTrak EX Controller card. See Figure 2.

Figure 2. BBU module connectors on EX4650 and EX8650. The EX4650A and EX8650A are similar



8. From the opposite side of the SuperTrak EX Controller card, insert and snug the three screws to secure the Battery Assembly.

Figure 3. Three screws secure the Battery Assembly. The EX4650 and EX8650 is shown. The EX4650A and EX8650A are similar



9. Install the SuperTrak EX Controller card back into its PCI-Express slot.

10. Replace the screw holding the SuperTrak EX Controller card to the system case.
11. Attach the SAS multi-lane cables to the SuperTrak EX Controller card.
12. Replace the cover of your system.
13. Power-up the system and launch WebPAM PRO.

    See “Logging into WebPAM PRO” on page 83.

After installation and power-up, a new battery takes several hours to charge. From that time, it should show Fully Charged. See “Viewing Battery Information” on page 118.

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